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THE COW

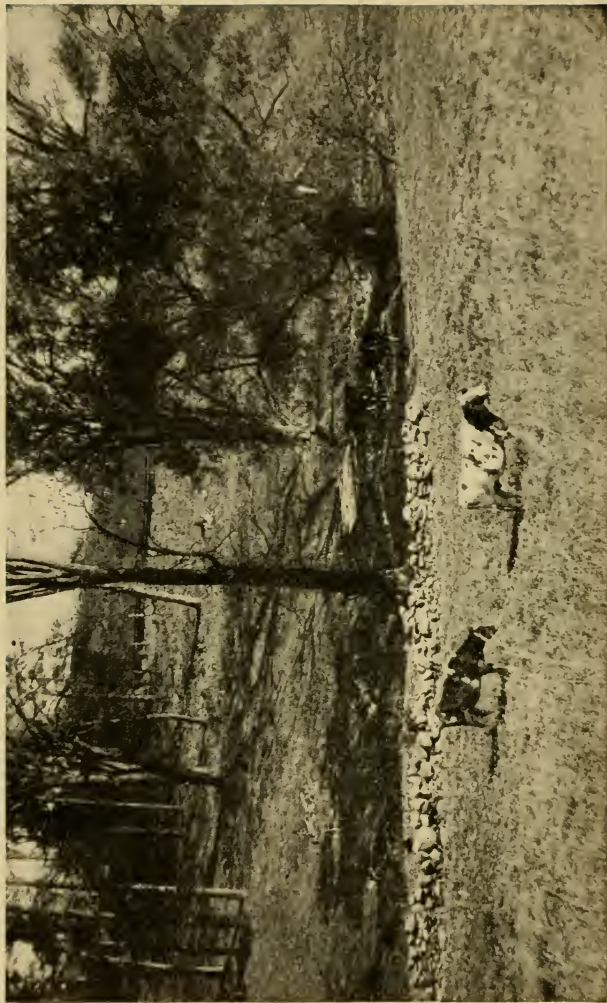
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3. THE COW JARED VAN WAGENEN, JR.
4. VACATION ON THE TRAIL, EUGENE DAVENPORT



I. THE REAR PASTURE.—“A land of trees and rocks and little ravines and old stone walls mostly fallen down.” See page 64.

The Open Country Books—No. 3

THE COW

BY

JARED VAN WAGENEN, JR.

New York

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1922

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TO
THE BY-GONE MEN OF HILL-
SIDE FARM WHO WERE DAIRYMEN
ACCORDING TO THE LIGHT OF
THEIR DAY AND GENERATION

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PREFACE

THIS little book does not pretend to be a textbook nor a treatise on dairy husbandry, for there are plenty of such books already. It is simply an effort to set down the ideas of a dairyman concerning his own business and to view the cow as a very interesting animal who after all these thousands of years of close companionship with man still retains many primal instincts and many hereditary tendencies. So we may ask the meaning of old winding cow-paths and little calves hidden in the bushes and the tragedy of the herd bull condemned to spend his days tied to a post by a ring in his nose (like Sampson, old and blind, grinding meal for his conquerers) when his place is to march proudly at the head of his obedient herd.

Dairying has grown into a vast and complex and exceedingly modern business, conducted in great manufacturing establishments with white tile and steam sterilizers and pure cultures and bacterial counts; yet there ought to be a place to revive at least the memory of old farm houses under great trees and herds winding down the road at milking-time, and farm women making butter in cool spring-houses or shadowy white-washed cellars. Such

things were still within the memory of him who writes, nor is he old. And it is confidently hoped that this attempt will have very direct and practical value to the present-day dairyman, for he cannot expect his best success unless he has a real regard for his cow and likes to read about her.

Farm butter-and-cheese-making are rapidly going the way of the farm spinning-wheel and the loom. Horace Bushnell, Connecticut preacher and author, speaking at a town centennial in the middle of the last century and looking back on the memory of his youth and the domestic manufactures of that time, lingeringly and lovingly called it the "Golden Age of Homespun." The corresponding age of dairying is about to go forever, and in some respects the world will be the poorer thereby; but this at least remains: That we men who would farm not only for to-day or to-morrow but for the generations yet unborn must have the animal as part of the farm scheme. Agricultural content and permanent prosperity are typified best not by a plow on a field arable, but by flocks and herds winding over green pastures.

So this little volume is not an attempt to reduce cow-keeping to cold demonstrations of chemistry and physiology and bacteriology—and cash—but rather to strike the personal note and to speak of dairying on one old hill farm and to put into language a little of the glow and the glamour of real farm life.

JARED VAN WAGENEN, JR.

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THE COW

I

THE KINGDOM OF THE COW

As the Pilgrim journeys through the Farm Country, he may come to the long reaches of the great river where luxuriant plenty broods over the land, where the smooth landscape lies in checkered squares, where the flat grain fields stretch away to the horizon and the earth yields her increase to even a careless husbandry. In regions such as these are grown the grains that figure in the produce exchanges of the world. When the Pilgrim leaves behind him the broad stretches of the fertile plain and sets his face toward the Hill Country, he will come to a pleasant land where the brooks run in narrow valleys and rocky pasture fields fenced by old stone walls cling to the slopes of the hills and springs of pure water bubble up beside the road. He will find close snuggled in the elbow of the valley old farmsteads under spreading trees, and perhaps a row of shining milk-cans sunning beside the kitchen door. Then there will be big red barns with silos, and on the alluvial soils along

the water course and climbing a little way up the hills will be close-turfed luxuriant meadows and young corn fields shining and dancing in the breeze. If it be near evening there will be merry children coming home from school and patient herds with full udders waiting at the bars for milking-time, and boys coming for the cows will call to them "Co-boss, Co-boss, Co-boss"—the same calling-cry that English-speaking farm folk have known for many centuries. By these tokens the Pilgrim shall know that he has come unto the Kingdom of the Cow, for be it noted that the cow comes into her own and rules unquestioned only where Nature has not been too kind.

✓ So it will be best for us at the beginning frankly to recognize the fact that most of us are dairymen by force of circumstances. Of course, every good farm is suitable for cow-keeping, but when we speak of a "dairy-farm" we really mean one which is capable of giving good returns when used in this way, but which can hardly be recommended for general agriculture. A cursory survey of the typical farm scheme of different localities will demonstrate the correctness of the general statement that where lands are fertile, level and easily tilled and climatic conditions are kindly, men steadfastly refuse to milk many cows. The truth is that we are all as lazy as we dare to be, and on land naturally fertile and adapted to the use of modern machinery it is possible to make a living by types of farming

that demand less sustained effort and skill than dairying. For this reason the typical corn-belt farmer is not a dairyman, nor is he likely to become one. I am not sure but that deep down in his heart he really despises the man who will milk a cow, deeming it women's work or worse. Rather would he guide his three-horse draught team and riding plow, laying the long furrows of his quarter-section, or see his shocks of wheat standing like the tents of an army in orderly array or lave his hands in the stream of golden grain as it pours from the threshing machine. Not for him is the cow with her bovine ways and the personal service and undeviating round of attention which she exacts from those who would succeed through her. Yet unconsciously he fills his place in our agricultural economy, for some one must grow the world's coarse, cheap, staple crops of wheat and corn and hay. He and his ilk may be said to follow agriculture along the line of least resistance. His (excepting only the grazier) is the type of farming that calls for the minimum of both labor and skill. Under favorable conditions, i.e., with abundant fertility and good markets, it may yield ample returns and may accumulate considerable agricultural wealth, but if unintelligently followed the end is confusion. It is soil-mining rather than permanent agriculture. Sooner or later come falling crop yields, and with them social and economic decay unless a system of purchased plant-food and

humus-maintenance be introduced. In the past this soil-miner has been only a sojourner in the land with his face set toward the new country of our unconquered West. Recently he and we have rather suddenly awakened to the fact that there are no more great undiscovered agricultural empires in America, and this has resulted in much writing and orating and taking stock of our agricultural resources.

There is another and very much higher type of farmer who is a gardener and fruit-grower rather than a dairyman. In localities favored as to soils and market conditions, horticulture has possibilities of production and profits that are undreamed-of in dairying. Always, however, large areas of the less favored lands of this country can best be utilized in maintaining cows. There are some conspicuous examples of successful fruit-growing on lands that do not readily lend themselves to general crop production, but broadly speaking our dairy lands are those which, on account of deficient plant-food, steepness, presence of stone or poor drainage, are not utilized for cereal cropping and at the same time have no horticultural adaptability.

Just which farms and localities belong to this category is a matter of individual judgment and community experience. Perhaps 75 per cent of New York and an even larger proportion of New England farms will find their best possibilities

when used for dairy purposes. In the South and West the percentage is smaller, while in the best of the corn-belt country dairying is usually incidental to other agricultural methods. In a general way, all those farms in the East where pasturage is necessarily an important part of the scheme are typical dairy farms. Some steep and rocky fields now used for pasture properly belong to the class of forest lands. There are other areas too thin and poor to be grazed profitably by milch cows, which in large units might possibly be utilized for sheep, especially those of the Merino type. In the West it is the sheep and the steer rather than the cow that promise the best use of the semi-arid regions. Taken all in all, the old northeastern states, together with Minnesota and Wisconsin, may fairly be termed the Kingdom of the Cow.

Of course, fertility and topography are not the only factors that determine the location of the dairy industry. Climate, especially in the past, has played a most important part. Before the introduction of artificial refrigeration, the handling of dairy products required ice or at least cold spring water and cold cellars for storage. These essential conditions restricted the industry to the North. Even now, cow-keeping has never attained any large place below Mason and Dixon's line. This failure of dairying to establish itself in the South has a social as well as a climatic signifi-

cance, for the negro, either slave or free, has always been the main dependence for agricultural labor, and as a race they are perhaps less calculated than any other to bring to the cow the intelligence and systematic attention necessary for success. In fact, the distribution of our various types of agriculture is in many ways a matter of racial stocks.

Up in some of the northern counties of New York and over across the line in the domain of King George are localities where dairying is supreme—where we find Presbyterian churches and spotted Ayrshire cattle and big, high-stepping Clydesdale horses and strong-featured men with a burr-r-r in their speech. These are Scotsmen who sought a better country, but have remained most loyal to the animals and the worship of the homeland. It is this same Scot who has given to the ancient dairy county of Delaware, in New York, not only stern standards of living but also perhaps the most highly specialized dairying in America. Likewise in the Middle West and in Minnesota and Wisconsin, it has been the Dane and the Hollander and the Swede, together with the emigrant from old New England, that have turned much of these states into cow pastures. On the other hand, the Italian and the man from eastern Europe turns very readily to horticulture. He trims vines and grows onions and potatoes and garden truck, and with the aid of his mate and brood cuddles and caresses the earth into fruitfulness, for he is to the

manor born, but only slowly does he come to love the cow.

Of course, to a certain extent, markets are a determinative factor in the distribution of the dairy industry. However, the years tend to level advantages in this regard. Markets are a matter of time and accessibility rather than of distance and freight rates. Better transportation, together with a little sound dairy bacteriology, have greatly extended the zone of market milk production. Fast express service and refrigerator cars have made it seem very simple to carry milk in first-class condition for many hundred miles. A short stretch of muddy country road is a greater handicap than a hundred times as far of gleaming steel rails. Both New York and Boston draw their milk supply from at least six different states. Possibilities like these are upsetting our old ideas of market advantages. This was not always so. Orange County once deemed that it had a natural monopoly of the New York City milk trade, and not so long ago "up state" butter went west to Chicago. Men were glad to believe that there was a mystical something in the air or the water or the grass that would forever bar the cow from the Mississippi Valley. Any hope of this kind has proved but "a vain thing for safety," for the cow has constantly found her way into farther places. Nearby markets are no more necessary for milk than for small-fruits and perishable vegetables.

This much at least is certain: that with the years the Kingdom of the Cow is a constantly widening empire. Even like the sheep of which Vergil wrote, she "hath a golden hoof." To some one-time fertile regions she comes late, but she comes to save. When the soil-miner has wrought his perfect work and the earth no longer gives her increase—when seed for the sower and bread for the eater grow scanty—then the cow comes to the rescue. From the beginning she has exemplified the doctrine of soil conservation. Where she makes the land her own, green carpets of pasture possess the fields, alfalfa throws its perfume to the breeze and corn waves and rustles in the sunshine. There great new barns rise in place of the old, and white-walled farmsteads speak of peace and plenty. There contented farm folk found dynasties by striking the roots of their lives deep into the soil. "And of such is the Kingdom of Heaven."

II

CONCERNING THE COW HERSELF

THERE is somewhere a story about a painting in which the menagerie is represented as trooping up the gang-plank into the ark in orderly array, accompanied by Noah himself, carefully bearing a tin box inscribed, "Papers relating to the origin of the DeLevis family." Very much the same sort of loving service has been rendered by the naturalist to the cow. The geologists have patiently dug the million-year-old skeletons of her forebears out of the earth and have christened them with long hard names, and the zoölogists have taken their present-day and extinct representatives and have referred them to one or to several species, each man according to his own ideas of the philosophy of classification. We may dip but lightly into zoölogy by saying that all our domestic cattle are of European origin and perhaps the dominant species, *Bos taurus*, may do for a family name. If we are born zoölogists rather than dairymen, we may read books with prints of fossil skeletons and skull measurements and discussions of dentition formulæ, and may at least have the satisfaction of

finding out that *Bos taurus* was a variable species; and after that we can leave the matter to the comparative anatomist.

In the conformation and the habits of the present-day cow there are many things we cannot understand unless we suppose them to be reversions to something in the remote ancestry. The expanding science of genetics may change our conceptions of some of these matters; yet even genetics is based strongly on the conception of the continuity of heredity. It is pleasant to conjure the past and to try to explain contemporaneous facts on tendencies we assume to have been present through the long course of time, unless, indeed, we can demonstrate their origin now and then in modern nutrition or other factors. By this practice of retrospect we endeavor to reconstruct for ourselves something of the conditions of the earth and of man in vast former time.

For our purpose let us rest content with the general statement that for unknown centuries and up until early historic times, wild cattle roamed the forests of Central and Northern Europe and the British Isles, presumably entirely undomesticated and uncontrolled. Very fortunately, in certain old European parks, a few specimens of these cattle have been preserved so that we may know something of their appearance and habits. Their color markings at least were peculiar. They seem to have been great brutes, typically white in

color, with brown or black ears; even today there is an occasional reversion to the ancestral type. Solid white is not an infrequent color among Shorthorns, and a good many years ago on Hillside Farm we came into possession of a rather elderly cow of dubious quality and checkered ancestry. She was even as the "milk-white bull" on which Priscilla, bride of John Alden, rode on her wedding day, but her ears were brown. I used to say to myself and her: "Old cow, you are the heir of all the ages. Your ancestral story goes back and links with the days when Abraham drove forth his herds from Ur of the Chaldees and Job's sheep lay sick in the land of Uz, and drowsing shepherds watched their flocks beneath the stars on the plains of Shinar. In you there may be the blood of famous Shorthorn sires and the blood of dairy queens. It may be a thousand generations ago some far-off savage men had first dominion over you. Your characters have been buried beneath the accumulated mass piled up by many masters and changing environment, yet once again, like the geologic outcrop of buried strata, that long forgotten color of the wild ox has reappeared in you."

This white cow with her brown ears was a truly remarkable example of color reversion such as would not appear once in many thousand times, but many cattle show dark patches inside the ears which may fairly be regarded as a tendency to hark back to primitive coloring. We forget, perhaps,

how almost infinitely long is the history of the domestication of animals. Indeed, in the case of cattle, so far as exact names and dates and operations are concerned, there is very little before the great Thomas Bakewell and contemporary breeders less than two centuries ago, but its beginnings go back before our books and beyond tradition and even beyond the days when were accumulated the mounds of refuse in front of the cave-man's door.

We are fond of dwelling on the great gulf that separates our excellent dairy cow from her forest-roaming ancestor, and it is all true, yet, after all, the veneer of domestication—or shall we call it civilization—is very thin. The cow, as also man, is still an animal of many primitive impulses and hereditary memories. So long as she is undisturbed, she seems very much a creature of habit. As Isaiah long ago wrote, "The ass knoweth his owner and the ox his master's crib." She stands patiently at the pasture bars and answers the call of her owner and does violence to all the instincts of her motherhood by unresistingly offering her udder to the hand of her milker, yet in time of stress she seems very quickly to fall back into her primitive wildness.

I have repeatedly seen young heifers turned into a back pasture for the summer who, owing to lack of attention and contact with man, have "gone wild" and in a few months have forgotten all the

external evidences of domestication. The heifer that in spring was so much a part of the barn family that she could hardly be made to step out of your path and that would follow like a dog with the hope of a word and a lick of salt, is capable of apparently forgetting in a few weeks her age-long training and contact with man. I have seen them sniffing the breeze with elevated head and distended nostril and flickering ears, and at sight of their one-time master bounding wildly away through thickets and over fences, nor hesitating, if cornered, to turn and fiercely fight him who under normal conditions they fully recognized both as master and protector. Once having reverted to this condition, they will keep to the woods by day and feed by night, and can be reclaimed only by the art of the trapper or even the hunter. Yet if brought to bay and established under the care of man, the domestication of centuries promptly reasserts itself and the old dependence on man and trust in him comes back completely.

It ought to be said in passing that in this respect at least, the domestication of sheep seems much more complete than that of cattle. Sheep seem to have more of dependence and something allied to affection. They learn to answer to a calling-cry much better than cattle and to follow and obey to a greater extent. I have never known sheep, no

matter how long neglected, to fail to welcome the coming of the master by crowding around him with long bleating of welcome.

So, too, we must not blame the bull because he is sometimes sullen and often wild and dangerous, for after all, he is merely true to the instincts by virtue of which he went lowing at the head of his band of females and fought off his rivals and held his place only by the ordeal of combat. The life we condemn him to lead is itself the tragedy of the farm world, and as he stands wearing out his years in solitude and loneliness, chained by his nose in a darkened stall, I wonder does he ever have flashes of hereditary memory or tantalizing dreams of a far-off time when he stalked the woodland at the head of his herd, master of all he met, and the valleys echoed to his roar and the earth trembled to his battle charge? May we not fairly assume that the fierceness of bulls is now the comparatively feeble survival of a once most vital but now long disused character, which we may suppose is slowly dying as the generations pass? We must not blame him for what he cannot help. He may never be a playfellow for our children, and we must always consider him as a potentially dangerous brute whose pent-up instincts may suddenly flame forth in uncontrollable fury; yet even the bull is not insensible to the power of kindness and we must use him with gentleness, remembering what his nature bids him be.

Doubtless it is true that with the progress of domestication our animals, even as man himself, are leaving behind them many characters which were once supremely vital, but under changed environment are first disused and then forgotten. A number of such questions are connected with baby calves and bovine motherhood.

Unquestionably there was a time when the cow brought forth her young only in the spring, merely because it was then that the weather was warm and the grass green and abundant, and hence the calf born then stood the best chance of survival; and so by the stern law of biology, this spring-time birth became a firmly fixed character of the cow, ingrained into her very constitution through long centuries. But when cattle come to be kept under the entirely artificial conditions of regular care and certain shelter and assured food supply at all seasons, this spring-time birth habit ceased to be advantageous and has been largely lost, although it seems that even now the birth time tends to coincide with the ascending sun.

On the other hand, as has been noted, sheep seem in some ways to be more truly domesticated than cattle, but so far as the lambing time is concerned, they obey ancestral habits more closely than the cow. The mating instinct in sheep lies practically dormant during the summer months, arousing only when the cool autumn nights come on; and so the normal lamb is born with the coming of

spring sunshine. The rearing of the so-called "hot-house lamb" makes it most desirable to have the young dropped in the early winter; but in this, with every effort, only partial success is possible. The same spring-tide reproduction is noted in poultry, for egg-laying practically ceases in the three months farthest removed from April and May; and the wild fauna of our fields and woods render almost perfect obedience to this same law. The fact that the cow and the horse have largely forgotten this ancestral trait bears testimony to the vast period of time which must have elapsed since they became subject to the control of man.

Other phenomena connected with maternity are being modified with the generations. For example, in those breeds of fowls in which the egg-laying tendency is most highly developed, the instinct of the female to sit upon the eggs to incubate them is surely far weaker than once it was and has become most uncertain and capricious. Doubtless there was a far-off time when the cow guarded her young calf most jealously and, if necessary, fought off the wolf and bear, with lowering head and flashing horns, although she does not, like the horse, use her hoofs in combat. But of this old mother instinct only the rudiments are left.

To the dairy cow of today, the birth of a calf is an incident rather than an event. She seems to reason that it will be well taken care of anyway without any particular attention on her part. On

the whole, she obeys certain instincts, but obeys them feebly. If at pasture, she will commonly choose an isolated or partially concealed spot where her calf will be born, but she is likely to be surprisingly careless about it afterwards. I have seen more than one cow so lost to the sense of duty that she absolutely refused to grant her offspring its first meal. However, the manifestation of mother-love varies greatly in different individuals. There are some cows, who are, to use a barn phrase, "crazy for their calf," but this is the exceptional animal. Many cows trouble themselves very little about it. The idea of a cow mourning for her calf like "Rachel weeping for her children and will not be comforted because they are not," is a pretty bit of fiction which is hardly borne out by the facts. In most cases, the cow, given her choice between her calf and a feed of silage, will basely take the silage.

There is one strange bovine habit, however, that at least gives ground for surmises. Many, perhaps most cows, will, on the birth of a calf, devour the fetal membranes, a procedure surely utterly at variance with her usual ideas of diet. There is really no rational explanation for this most astonishing practice unless we assume that the primitive cow did this in order that it might not attract the beast of prey and so reveal the location of her calf. If so, does the mother cow, standing at ease and safety in a box-stall, respond to some

dim hereditary memory of what her own ancestor did a thousand and more generations before? Or, may modern science find that this unusual diet supplies some need of the bovine body at this particular moment?

It seems to me that the young calf exhibits more of the primal instincts of the wild than does the mother. Under native conditions, it must have been some days after birth before it began to run by its mother's side with the remainder of the herd, and during this period if there was any one idea that was firmly stamped into its little bovine brain, it must have been never, never to betray its presence by movement or voice. So in obedience to this training, the baby calf will lie quietly for a very long period unless aroused by its mother. I do not know how long the calf would remain quiet and I certainly have never had the heart to try. It will often lie for twenty-four hours and probably much longer. I doubt not that the youngster gets very hungry and possibly lonely, but it does not forget its hereditary training. Stoical philosopher that it is, it curls up, pokes its soft little nose into its furry flank and tries to sleep the hours away until mother shall come and give the glad signal that everything is well.

Very frequently I have gone to give the youngster its first lesson in drinking, and have found him so sleepy and suspicious of my well-meant attentions that I could not arouse any interest in



II. AT REST.—The herd in October days.

getting his first meal out of a tin pail, yet the coming of the mother with just a low mother-call or a caressing touch of her tongue would almost instantly find the calf alert and ready for a meal from her udder. The lamb seems to look out on this cold world with different vision, and if long neglected by its mother announces the fact to everybody by piteous baby cries or bleating.

It seems remarkable that the new-born calf contrives to nurse as quickly as it does. Usually within an hour or two after birth, with wide unseeing eyes and wobbly uncertain footsteps, he staggers against his mother and promptly finds his way to her full udder. Of course, under modern dairy conditions, the calf is allowed to nurse in nature's way for only a day or two at longest and then is suddenly and rudely snatched from the maternal fount forever and compelled to take his meals out of a bucket supplied by a man in overalls. The greatest wonder is how rapidly he manages to accommodate himself to changed conditions. For untold generations the calf has learned to look up and search when it is hungry. We compel him to do the diametrically opposite thing, to look down and drink with its nose at the level of its feet. No wonder we think it stupid and sometimes lose our temper, yet generally from three to six tactful lessons will suffice to establish the new habit. It is commonly said that the calves of our special dairy breeds learn to drink more

readily than the beef breeds, which is what we would expect, for the former have been accustomed to this mode of infantile feeding for many generations.

The dairy cow today is so completely a creature of artificial environment and acquired habits that we can only guess how the calf and its mother fared in the old days. Doubtless she nourished him and guided him and, if necessary, fought for him the first summer, and by autumn he was a lusty thick-haired youngster. Then as the time of her next calf drew near, her udder ceased to yield anything to him. Her mind was filled with plans for the new baby, and he straightway thanklessly forgot her and drifted away to frolic or strive with his kind. On the modern dairy farm, the calf's ideal of a mother is typified by a herdsman with a bucket of skim-milk, while the material affections and instincts of the cow go out to a man with a tin pail and a three-legged milking stool; and that is why family ties grow lax in the dairy world.

Both historical evidence and climatic adaptability point to the fact that the cow is a native of temperate or cold regions. She is apparently not at home in the tropics, and even in our South Atlantic states she tends to diminish in size and vigor, although this is possibly due to deficient food supply and the scourge of the Texas cattle tick rather than mere questions of temperature. With

winter protection she does remarkably well in very severe climates, and the well-fed steer thrives and enjoys himself in the open in temperatures below zero. It has been noted, however, that, unlike sheep, cattle do not dig or paw away the snow to get at the grass beneath, and this would indicate that the cradle of the race was not habitually snow-covered in the winter. On the other hand, like deer, the cow readily browses the young twigs of trees when grass is scanty.

We can only guess concerning the history of her domestication. There was surely a time when she roamed the woodlands and knew not the restraint or the protection of the hand of man. The cave-man snared or trapped her and gorged himself on her abundant flesh, and with a sharp stone stripped off her skin and shaped it into a rude covering against the cold. The human slowly and laboriously struggled up toward fore-thought, thrift and civilization, and one day a wise old savage and philosopher of the tribe made an infinite advance when he said, "Would it not be better to capture and tame some of these fine beasts and from them rear others in order that we may have them always at hand for food and skins instead of depending on the uncertain chances of the chase?" and that day the first Animal Husbandman arose.

And another time some great thinker of the clan observed that some of his increasing herd served his purpose better than others because of size or

vigor or perhaps because of color markings that he fancied, and he reasoned, "May I not kill the calves of the cows that please me least and preserve the calves of those that I like best and thus improve them all?" and that day the first Breeder stood forth and systematic improvement was begun. And then again, when the mother of a tiny human babe had died—killed perhaps in a savage foray by a neighboring clan—the bereaved father in his helplessness and tenderness bethought himself of drawing milk from a female of his herd and thus preserving the life of his child, and that resourceful father became the first Dairyman. Advances of this kind once made were never lost.

There is every reason to think that the genus *Bos* readily yields itself to domestication. We must remember that domestication means far more than mere training. The animals of a menagerie may be tamed and look to man for food and may be taught certain habits and tricks, but they can hardly be called domesticated. The real test of domestication is the free reproduction of young under the changed conditions, and few animals when kept under artificial confinement will meet this test. Not only this, but the way in which oxen are readily broken as beasts of burden show how completely their impulses have become subservient to the will of man.

In any case, the written history of the cow is very short as compared with her unknown past.

The story of her domestication, if we knew it, would be that of the race. The tale of her conquest begins when man first emerged from a wandering hunter into a pastoralist and began to build circular or mud huts beside the water-courses. Before recorded history, the domesticated cow existed, and the earliest books of the Old Testament—those that speak to us concerning the child history of the race—are musical with the bleating of sheep and the lowing of cattle and the tinkling of the bells of the camels. The domestication of animals and man's struggle out of savagery went on side by side, because only after he had acquired beasts of burden that could draw the plow or move objects that were beyond his strength was it possible to make any progress in agriculture or permanent architecture.

The observant farmer-naturalist of the future will have new problems to challenge him, if he lives in warm-temperate and hot countries, because of the introduction of a very different strain of blood in recent years. This strain is the zebu or *Bos indicus*, the sacred cow of India. The zebu is introduced with the hope that crosses with common cattle will better adapt the animals to warm climates and diseases. One sometimes sees the marks of such crosses in the lighter color, lopping ears, heavy hanging dewlaps, recurving horns, hump over the shoulders, and the very different eyes. What permanent effect these introductions will

have we do not yet know; and what traits of ancient ancestry may come from the oriental countries will be an interesting observation for future generations to make.

When some day a great artist shall worthily idealize on canvas the epic story of the American pioneer as he lays the foundations of civilization in the wilderness, his trusty animal co-laborers and messengers in the task will be pictured not as prancing steeds, champing the bit with distended nostril and flashing eye—such as Ulysses had at the siege of Troy—but they will be great beasts with placid eyes and mighty shoulders and heaving flank and wide-spreading horns, the glorious ox-team.

A drowsy cow beside the bars again
Patiently waiting for the herdsman's call
With dim and far-off memories in her brain,—
What would she say if she could tell them all?

Comes to her visions of an ancient past
Before man's yoke upon her neck was laid
When thundering down aisles of forests vast
She made one of a sweeping cavalcade?

Can she feel honor that she holds such place
In the world's need that unto her it clings?
The burden bearer of the human race,
The foster mother of its proudest kings.

The twilight comes—fades from the sky the light,
Low in the west the star of evening swings
And couched in fragrant pastures through the night,—
I wonder if she muses on these things?

III

THE SIMILITUDE OF THE COW

SOME years ago one of the educational institutions, in furthering its nature-study work, asked the school children to draw an outline picture of a cow. One pupil in New York City sent in a sketch—certainly original—showing a cow with udder extending from the hind legs to the forelegs. I suppose the youngster had taken the pattern from the good old text-book picture of Romulus and Remus suckled by the she-wolf; but the child had never known a cow, perhaps had never seen one. His experience of country things was much like that of another pupil in the same city who thought clover was part of a box because a certain article of food had come into his home in a container with a clover-leaf brand. We who live in the open fields little realize what crude mental pictures of animals and plants lie in the minds of thousands of our people.

Note the cow lying down. Her fore feet fold back under the body; her hind feet project forward but are not covered; her body is not flat on the ground, but tilted over to one side, the hind quar-

ters lower and flatter, the front quarters usually more erect, the head generally elevated above the line of the shoulders, with variations as noted in Chapter IV.

When she gets up she lifts her forequarters on the elbows, then places her hind feet on the ground and elevates the rear quarters, then brings up the fore parts to full stature. She stretches herself taut, lowering her head in the process, whisks her tail to one side, and is ready for any new event. The horse arises by getting up directly on his front hoofs, then raising the hind quarters.

Once before you, the cow is a ponderous bulky beast, the very mass of her—if she is of the big breeds—striking fear into the minds of the timid as they see her rise. She seems to shake the ground. The huge bulk conveys an impression of angularity,—a massive rectangle with projecting prominences at the hips and above the front legs, thick neck supporting an elongated head carried, when in resting position, in an upward direction. The front legs stand straight and post-like under the weight of front body and head, about equal in length to the vertical width of the carcass; but the feet stand obliquely downward and forward from the legs, bearing the weight by strength of ligaments rather than by direct impact, making the support to look indirect and insecure. The hind legs do not have the post-like effect. They are placed well toward the end of the rectangle; the

bones present a series of angles, and the hock or joint points backward; the feet are set obliquely, as in front. But while the support appears to be insecure—an appearance that is much accentuated when the skeleton is in view—the series of angles and indirections provide for movement in all directions and great elasticity of stride. The hoofs are two-parted, carrying forward the line of the lower leg and fetlock, and make the characteristic double footprint. The tail hangs straight from the top of the hip, continuing the extension of the backbone, with the fly-brush comprising the lower half; it is well provided with muscles and is capable of making a quick and powerful sweep.

In general, the back presents a straight line from hip to shoulder, often with a downward curvature; the line rises slightly over the shoulders, and then takes a downward and upward curve to the poll of the head. The lower line of the body presents a graceful upward curve at the rear, disclosing the udder; thence there is nearly a straight course to the front legs; and beyond and between the legs extends the brisket, like the prow of a ship, following upward into the folds of the soft dewlap that depends from the neck. The most graceful part of the animal is the upper neck, attractive in conformation, flexible, soft and pleasant to the feel; it is about the neck that one wants to throw the arm, for a cow responds to affection.

The cow and the horse have different methods of accomplishing the same end. The horse must not be allowed to fill himself with water after a long hot day in the fields lest he get indigestion, but the over-heated ox refuses water until cooled off.

Both animals have specially adapted organs for grazing but quite unlike. The cow has thick and relatively immovable lips, but she has a tongue which she can protrude far out of her mouth and she uses this as a sort of sweeping organ to grasp and gather the grass and pull it into her mouth. She can use it as skillfully and daintily as an elephant uses his trunk. The tongue of the horse has no special adaptability in this regard but he is furnished with a prehensile upper lip that is a marvel of sensitiveness and delicacy and that permits him to pick up and bring to the mouth single kernels of grain in a way that seems almost incredible. Cows have front teeth on the lower jaw only with a tough cartilagenous pad above; in grazing their food is torn or pulled off rather than bitten off. The cow does this by seizing the grass and then pulling it off by a forward motion of the head, that is, she "eats away from her self," while the horse grazes by a backward pull—eats "toward himself."

Cattle eat rapidly and swallow the food with little chewing, relying mainly on subsequent mastication. As soon as she is satisfactorily filled and

can find time for solid comfort and contemplation, the cow regurgitates the food and each bolus or "cud" is thoroughly rechewed and ground, several hours of each day being given up to this (for her) very pleasant task. Each "cud" is commonly given from fifty to seventy strokes of the teeth before it is swallowed and replaced by a new portion. Calves chew more rapidly than older animals. The cow that is seriously sick ceases to ruminate and if she again "finds her cud" it is joyfully hailed by her owner as an evidence of returning health. An interesting comment on how late ignorance and superstition linger among us is the fact that a generation ago many cow-keepers believed that the cud was a definite something—a sort of personal possession belonging to a cow and that if she was so unfortunate as to "lose" it she must have some special help to replace it. Many weird combinations—a hunk of fat, salt pork being one of the most approved—were forced down the throat of sick cows in a well meant effort to supply this particular need. Not only "loss of cud" but "wolf-in-the-tail" and "hollow-horn" were classic ailments of the old-time quack cow doctor. For "hollow-horn" he bored a hole in the horn with a gimlet and poured in turpentine. If the miserable cow died, he cut off her horn for the satisfaction of the owner and, lo, it was hollow! an incontestible proof of the correctness of his diagnosis. This may sound like fanciful invention or a tale of the Dark Ages, but

it was established veterinary procedure within the memory of living men.

The normal udder of the cow has four teats as compared with two teats in the mare and sheep and twelve to sixteen in the sow. However, it is not at all uncommon to find two smaller additional or supernumerary teats and these have frequently been regarded as an evidence of special dairy excellence, but they detract from the appearance of the udder and many breeders make it a rule to cut them off as soon as noted in the calf.

Twins among cattle are exceedingly rare. Within the memory of the writer there have been more than a thousand calves born on Hillside Farm, and among all these only one pair of twins; but probably twins are rather more usual than would be indicated by this particular experience. When one twin is a bull and the other a heifer, the latter is called a "free-martin" and there is a very old and persitent notion that she will prove barren. This is not what we would expect if reasoning from analogy, but the idea is widely accepted and two trustworthy men have assured me they have tried it out and that the popular belief is correct. Twins among horses are the rarest possible occurrence and horsemen aver that they never survive. On the other hand, among sheep, especially some breeds, twins are the rule rather than the exception while triplets are not rare. Piggies come into the world all the way from one up to twenty or more, and

wise old mothers often manage to raise in excess of a dozen.

It is a surprising fact that while so far as we know the wild cow was horned and the whole genus (*Bos*) bears horns, yet we have long had well defined races of hornless or polled cattle. The truth seems to be that hornless sports ("mooleys" in the farm vernacular) appear from time to time among all breeds and these show a strong tendency to reproduce the same condition in their offspring. The establishment within a few years of a herd-book for Polled Jerseys and also for Polled Durhams or Shorthorns indicates that it is not especially difficult to fix this variation when it appears. The prepotency of the polled breeds is very strong and the offspring of the first cross with horned breeds will be hornless in most cases.

From the standpoint of the dairyman the presence of horns is an unmitigated nuisance, so much so that the dehorning of cows has become a very common custom. The animal is fastened securely and the horns removed with a thin small-toothed stiff-backed saw, taking care to make the cut close enough to take a little circle of skin with it in order that there may be no further growth of the stub. The horn is hollow, and the operation is not so laborious as it sounds. This method makes a less serious wound than that caused by the use of the clippers. Doubtless it is a very painful operation, but it is kindness in the end and our New

York law specifically declares that it is not cruelty to animals within the meaning of the statute. Dehorned cattle, either milch cows or steers, herded together much more closely, and it practically does away with the danger of injury to the udder from hooking, an ever-present source of loss in the horned herd. Hornless animals may also be secured by applying a little caustic potash to the embryonic "horn button" of the three-day-old calf. Of course the logical plan would be to use hornless breeds and this is easy among beef cattle because there are already three well-known polled breeds, but unfortunately all our most highly developed dairy types are horned.

In size the cow ranges all the way from the little Kerry cattle of Ireland, which are the pigmies of the race, up to the great Shorthorns which are probably a little the largest of the breeds. The Kerry cow Red Rose was a famous prize winner of the breed but she is said to have stood only 38 inches tall at the withers. Some mature Kerry bulls have weighed only 400 pounds as compared with weights of 2500 to 2600 pounds—not at all uncommon in fat show bulls and steers of the beef breeds. Indeed there is at least the story of a Shorthorn ox reaching the almost incredible weight of 4300 pounds. The males are always much heavier and when mature should weigh about one-half more than a female of the same relative development.

IV

THE COW, MENTALLY AND INSTINCTIVELY

I HAVE been endeavoring to write a description of the cow—trying to see her in the same way that John Burroughs saw the robin or chipmunk or rabbit or woodchuck in his forest walks, or as Thoreau watched the wild life that strove or gamboled at the door of his lodge on Walden Pond. I must say that I do not think the cow lends herself to the same sort of treatment or, at any rate, the task is different and more difficult. All the native fauna of our fields and woods has been living under the same set of conditions for uncounted generations. An unchanging environment has tended to iron out all differentiation and variation. The present form, size, protective coloration, food and shelter habits, every biological character of the wild life of our farms represents an adaptation, presumably a very perfect adaptation, to the conditions under which they must live. Thus there has resulted for each species a very firmly fixed and almost unvarying standardization of type. Any marked deviation or mutation from this type would

be disadvantageous and hence would tend to be extinguished. So in wild life our differences are those of age and sex and season, but, eliminating these, almost any chipmunk might sit for the portrait of his race.

As soon, however, as we turn to domestic animals we find an entirely opposite condition. The cow for thousands of years has been under the control of man. With him she has crossed the seas to new conditions and strange environments. Because the conditions of life that surround her have altered, she has changed herself to fit them. This tendency toward mutation has been greatly intensified by the conscious selection of man, and many unusual variations that in her native woodlands would have been extinguished have been encouraged under the hand of man, preserved, and perpetuated. Thus, from being once almost immutable, she has become, together with the dog and domestic fowl, the most uncertain and varied of animal forms. The ornithologist describes our native birds with most painstaking care and minute accuracy and, at the expense of infinite time and patience, makes colored plates of their plumage and markings. What would he do, however, if asked to describe a hen and then taken to the poultry show to gather subject matter? How is it possible, therefore, to describe the color of a cow when she wears almost every conceivable shade except the blues and greens and every possible

pattern or irregularity of color markings? Or what shall we say of her horns when they may be wide-spreading and very large or small and "crumpled," when they may be black-tipped or ivory white or yet the color of amber, or not infrequently they may be entirely absent? What is the trick of language that may enable the dweller on Mars to visualize her? Plainly the cow cannot be described in the few terse, zoölogical, almost mathematical phrases that might picture the raccoon. At best we must describe her as a type rather than a sharply cut species.

The most interesting traits of the cow are not physical but mental. Every farm boy who has lived with her and driven her from pasture and milked her and taught the calf to drink knows that she has a rather definite psychology.

I think I can uphold the contention that most animals under domestication (the horse and dog being exceptions) are mentally degenerating as compared with their wild forebears. Even civilized man has degenerated in some respects, or perhaps a kindlier statement would be that some powers which he once possessed have been allowed to fall into disuse. Stewart Edward White writes that he has seen the Indian of the Canadian wilds stoop and smell the footprint of a moose and then promptly announce whether it was made within an hour or a day—a performance inconceivable to the civilized white man. Doubtless, we are not as

keen of scent or as fleet of foot, nor can we climb trees or resist cold as did our savage ancestors, but in place of these powers we have gained other attributes that are infinitely more worth while.

During the centuries the cow has left behind many habits and her instincts grow progressively more feeble. Once she had to live by her wits, to avoid and, if necessary, to fight off her enemies and to search for a food supply which was often scanty and always uncertain, but under the care of man she has become the most pampered of animals. Our modern idea of dairy conditions is that the cow shall never be allowed to be hungry or thirsty or cold. She is waited on with the most assiduous attention, for the owner knows that discomfort on her part will immediately be reflected in a decreased milk-flow. Thus her special senses are slowly dying, but two functions have at the same time been abnormally developed, her udder and her digestive apparatus. Holstein cows have given nearly thirty times their own weight of milk in a year—a marvelous performance made possible only by the fact that along with this abnormal development of the mammary glands there has been an equally remarkable development of the digestive function. The ideal dairy cow tends to approach the status of the queen bee, in which all the ordinary habits and instincts of the bee have been made subservient to an almost helpless organism that must be fed great quantities of pre-



III. THE HOLSTEIN.—The big black and white cow of Holland is the most popular and widely disseminated of the dairy breeds.

pared food in order that she may lay 3000 eggs a day.

Intellectually and morally, a very good case cannot be made out for the cow. Her standards of ethics and honor are low. In her conduct toward the other members of the herd she is both cruel and cowardly. Cattle by nature are polygamous, roving in herds with an old bull at the head who holds his place against all comers by ordeal of combat. Therefore, the instinct to fight is very strong among bulls. If a number of young bulls run in pasture together, they seem to settle satisfactorily the question of precedence and get along very well, but strange bulls fight on first introduction until it is definitely settled who is victor. These combats are sometimes rather spectacular with much pushing and scuffling but apparently with very little real injury to either party. This combative-ness seems to crop out in the cows as a sort of secondary sexual character, and every herd of any size will always have some hooking and fighting going on, resulting sometimes in serious injury to the udder. The cow shows herself a mean coward, because frequently, if one cow is fast in the stanchion and hence unable to defend herself, another not yet fastened will pitch in and gore her most unmercifully until she bellows with pain and terror. So also many cows standing in their stalls with a fellow on each side will strike with their horns first on one side and then on the other

in an effort to prevent their stall-mates getting anything to eat.

However, cow life is not quite all eating and fighting. Cows greatly enjoy licking all parts of the body that they can reach, this probably being the bovine ideal of a careful toilet. It is rather amusing to see another cow very carefully bestowing this attention on the head and face of a neighbor who, of course, cannot reach them with her own tongue. It is hard to decide whether the giver or the recipient derives most pleasure from this service.

The thrilling moment in the life of a cow is that wonderful day in late May when, after a long winter of confinement in the barn, she is again "turned out" to the pasture. That gala day stirs up all her old instincts and hereditary memories. Playfulness except in the calf is rare among cattle, but in the first hours at pasture the whole herd will often indulge in a wild rush, circling the field with tails carried erect, high over the back like banners and with strange awkward cavorting and galloping—for all the world like the rush of a lot of youngsters let out of school. The most ardent admirer—or apologist—for the cow can hardly claim for her grace of movement. Well fed and thrifty calves, during the first weeks of life, enjoy giving vent to their high spirits in much galloping in circles with clumsy kicking up of the heels, frequently accompanying such gymnastics with resounding calfish

“br-a-a-a-ah.” The adult indulges in such foolishness only on very special occasions, and the first day at pasture is one of these. When hard driven by a dog or anxious to rejoin the herd from which she has been separated, the cow is capable of a straightforward running gait that very easily outstrips a man, and will even rival a good horse, but the cow merely disporting herself has a particularly grotesque, plunging, wobbling gallop.

The herd on the first day at pasture eats very little for the first two or three hours. Rather it is an occasion for exploration and perhaps for surprise and annoyance that her domain is now so narrow, for she once roamed over many leagues instead of being limited by a fence-line inclosing only a score or two of acres. Life for a cow at pasture is made up of periods of grazing alternated with intervals when she lies at ease to pursue the pleasant task of chewing the cud while digestion prepares her stomach for another fill. As a rule, the resting cow assumes the attitude of lying squarely on the brisket and elbows (knees, in the incorrect speech of the farm) with the hind legs drawn up under her while she rests on one hip or the other, but occasionally she varies this position by stretching out at full length as if she were dead, even the head lying on the ground. This rather unusual position is more common with young heifers or calves. If pasture is abundant a very few hours a day suffice to gather her food, but

when scanty she must industriously pick all day for a living and even then is not fully fed, as the milk pail only too plainly attests. The real romance for the cow as well as her owner lies in those first golden weeks of early summer.

The gregarious instinct in cows is strong, and they tend to feed in a fairly compact herd. As you come near them you can see the long almost prehensile tongues gathering and sweeping the grass into the grasp of the jaws, and you can hear the gentle tearing sound as it is pulled rather than bitten off. An hour or two later the cows will be lying down, often closely bunched together, and in hot weather they are wise enough to choose the shady borders of the wood. They enjoy water in summer, and will often stand leg deep in bright running streams or ford considerable rivers. They do not, however, have the habit of wallowing in the mud after the manner of their close relative, the buffalo.

Unquestionably, there is a sort of mass-psychology in a herd which leads them all to do the same thing at about the same time. The farm boy who has always "brought" the cows as a part of his boyhood tasks well knows that if a part of the herd thinks it is about time to move toward the bars, all of them will prove to be of the same mind. Yet this same farm boy also knows that an occasional cow is a very poor mixer and will commonly be

feeding in a far corner by herself when the remainder of the herd has decided to go and see whether it is milking time. As a whole, however, the order of feeding and resting and traveling seems to rise from a common impulse.

In one phase of pasture life, however, the cow attains a sort of impressive dignity and that is when she is definitely "on the march." It is fine to see a large herd of cows who have suddenly determined to make a pilgrimage—it may be merely to go for a drink or to explore a distant part of the pasture. There they go, largely strung out in single file, heads up, looking neither to the right nor left, no foolishness, no distractions of eating or casual fighting allowed, but every matron stepping briskly off as if under orders. I feel sorry for them. It seems like a pitiful effort to rehearse within the limits of a pasture field the old-time long marches in search of far-off feeding grounds. Truly man has come to have dominion over her. To me the most interesting and impressive thing about the cow is this: that she still remains a sure foundation for biological musings and a riddle in atavism. Written history is short, but her story is very long. She is an ancient of the earth, and her career is linked with the forgotten men of the Old Stone Age who pictured her in rude outlines scratched upon the walls of their cavern homes. Her minor characteristics, her size, color, con-

formation and function have been modified almost beyond belief. Her very instincts no longer profit her, yet she still responds and acts on the suggestions of dim far-off hereditary memories.

V

CONCERNING COW-PASTURES AND COW-PATHS

✓ THE first dairyman was wholly a pastoralist. He proved himself a wise farm-manager and a skillful feeder when he led his herd where the pastures were richest, and after thirty centuries the Hebrew idyl, "He maketh me to lie down in green pastures, He leadeth me beside the still waters," remains the world's most beautiful symbol of tender and loving care.

The quest of pasture has been one of the primitive forces that have made history. Many of the great early migrations, which have forced whole peoples across deserts, over mountains and into new valleys and strange lands, have been the result not so much of the lust of power and the glory of empire as the insistent necessity for new pasture grounds. The thirteenth chapter of Genesis is not only an excellent sermon on the settlement of family quarrels, but it is also an illuminating treatise on the early pasturage situation in Palestine. "Lot also, which went with Abram, had flocks, and herds, and tents. And the

land was not able to bear them, that they might dwell together: for their substance was great, so that they could not dwell together. And there was a strife between the herdmen of Abram's cattle and the herdmen of Lot's cattle. And Abram said unto Lot, Let there be no strife, I pray thee, between me and thee, and between my herdmen and thy herdmen; for we be brethren. Is not the whole land before thee? Separate thyself, I pray thee, from me: if thou wilt take the left hand, then I will go to the right; or if thou depart to the right hand, then I will go to the left. And Lot lifted up his eyes, and, beheld all the plain of Jordan, that it was well watered everywhere. Then Lot chose him all the plain of Jordan; and Lot journeyed east: and they separated themselves the one from the other." Thus briefly did the Chronicler set down the story of an ancient quarrel and its wise settlement, and that same story has been repeated in every country and age until now, and nowhere more bitterly and insistently than in these very years in the range country of our own western states.

Pasturage surely represents the first beginnings of agriculture. Doubtless herds grew to large numbers and wandered widely before any man began to set up landmarks and boundaries and to claim a certain portion of the earth's surface for himself and for his heirs and assigns forever. Only when one man's pasture range began to en-

croach on another's did he do this but once having set up his claim he must needs defend it with his life if necessary, and so all our land titles rest originally on force or fraud, never on equity. It was a far cry from the time when men merely herded their animals until they began to till the ground on any considerable and systematic scale. In the days when animal-keeping merely supplemented hunting and root-digging, there were no large fields and no rotation of crops and no regular sowing and reaping. This at least seems to have been the rule among all Old-World peoples. The American Indians, on the contrary, among the most advanced tribes grew considerable areas of corn and beans and even planted orchards, but save for their dogs seem to have been without domesticated animals. The probable explanation is that almost all the animals of our farms today are of Asiatic or European origin and in all North America, with the exception of the bison, there would seem to have been no large easily domesticated grazing mammal.

Unquestionably the first cow-keeper relied solely on pasture, and only after considerable advancement did he develop foresight enough to provide stores of food against times of scarcity, such as drought in summer or snowbound winter months. It must be confessed that some cattle ranchers in our own western states have hardly gotten beyond this same primitive practice, and every year their

cruel and careless methods allow cattle to perish from starvation and exposure. In exceptionally severe winters the loss has been appalling both from a financial standpoint and from the animal suffering involved. As a matter of fact, all our farm animals exhibit extraordinary ability to withstand—or more correctly to live through—hard conditions. It was long a fireside tradition of the Susquehanna Valley that when the Cherry Valley massacre took place in the autumn of 1778, involving the captivity or murder of most of the settlers and the extinction of the community, some horses wandered off into the woods and one of them at least was not reclaimed until three years later, having somehow survived all the vicissitudes and rigors of the winters of the central New York plateau. It is certain that a race of hard ponies, descendants of horses, shipwrecked there long ago, can thrive perfectly on the coastal islands of tide-water Virginia.

There are still many parts of the world, including our own western range country, where practically all animal industry depends on pasture—a type of agriculture which is primitive and inefficient and must eventually give way to a wiser and more careful husbandry. This system can survive only on lands that are very cheap and abundant or else so steep, rocky, or unproductive as to forbid regular rotation and the use of the plow.

Viewed in the light of present-day methods, our

dairy ideas of a half century ago were certainly queer to say the least. Practically all dairy products were made from grass in summer, and the barn was frankly regarded as a sort of cold-storage proposition for the purpose of keeping cows alive until summer came again and green grass in the fields should enable them to give milk. Of course, there were even then occasional dairymen—men in advance of their time—who were wise and liberal feeders, but as a whole they seem to have had grave doubts that a cow could really yield milk when there was snow on the ground. Under this idea there were long months when men had a barn full of cows but no milk, and a generation ago one still spoke of a “coffee cow,” meaning thereby a cow kept “farrow” and fed with unusual care in order that she might supply a scant ration of milk for this dairyman’s family during the winter months. All this was a part of the old era when barns were frigid and windy structures, stables cheerless dungeons and when there were no silos and grain was deemed too valuable to be fed to cows. She was expected to receive somewhat less than a maintenance ration of corn-stalks and over-ripe hay and to become progressively more lean and hungry as the slow winter dragged itself along. She was expected to be “spring poor,” and no one regarded it as either a joke or a reproach to her owner. This is no exaggeration of what might be called typical dairying within the mem-

ory of many living men. Yet, with the coming of May and balmy days and springing grass, these same cows gave birth to their calves and under the very favorable conditions of pasture won back flesh and strength and vitality sufficient to carry them through another winter and incidentally to give considerable milk and brought to their owners what in that day was deemed substantial dairy prosperity. Had those cows been human instead of bovine they might, when filled with grass and a great content in the golden month of June, have moralized in the words which Shakespeare puts in the mouth of Gloster, "Now is the winter of our discontent made glorious summer."

From those bad old times the science of cow-keeping has changed so radically that the best dairymen have come to make milk in winter rather than summer. Warm and sunny stables, comfortable stalls, silage, early cut hay and liberal grain rations have made the cow and her owner independent of weather conditions. So far as milk production is concerned, June is hardly more favorable than December. Indeed, in the making of Advanced Registry records, where the aim is to force a cow to the last possible ounce of her milk yield, it is generally agreed that the winter is the most favorable season of the year. So also we feel sure that the well-cared-for cow that "comes fresh" in October will yield more milk in the next twelve months than if she calved in April.

All this does not contradict the fact that even under modern conditions, pasture is still of prime importance in dairying. There are now, and increasingly will be, men located on very valuable land which is level, fertile, and easily tilled, who will feel that they cannot afford to pasture it, but will depend instead on soiling crops grown under conditions of intensive culture. In some cases this will be good farming and sound management, but on the whole, our dairying still rests on a basis of pasturage.

It is not a foolish boast,—it is a fact that New York state is the real Kingdom of the Cow. Among the states of the Union it stands only seventeenth in available acreage, but it ranks first¹ in the value of its dairy products. Up in the North Country of New York the fields are fairly level, but the old glaciers have made them a dumping ground for their granite debris. These boulder-strewn and often poorly drained fields cover large areas of no possible agricultural use except for pasturage. St. Lawrence County has more than 96,000 dairy cows—a striking example of how a people has adapted its farm scheme to the environment.

Down in the southeast of the state are the two remarkable dairy counties of Orange and Dela-

¹ New York state seems to fluctuate between first and third place. She probably stands first in value because so much of her product sells as liquid milk.

ware where the cow has been supreme for a century. It is here where as nowhere else the romance of the old days survives. Long ago the old Orange County Bank printed its bank notes in golden yellow to signify that butter was the source of the wealth and prosperity of the county. The whole agricultural scheme of this region rests on the fact that the valleys are very narrow and the hillsides too steep and rocky to till, yet out of these same hills burst springs of pure soft water, and covering them is a carpet of small, sweet, natural grasses which have made them as famous in story as the blue-grass regions of Kentucky. Along the Pennsylvania line from Delaware County to the Chautauqua grape belt is the "Southern Tier," a region of river valleys with much not too fertile upland that more and more is coming to realize that it is fundamentally a land of cow-pastures. Indeed, when one comes to survey this great state, one realizes that ultimately the dairy cow will possess the land everywhere save on Long Island, parts of the Hudson Valley, the beautiful cereal-growing Finger Lake country of the western counties, and the favored golden orchard section of the Ontario shore. Conditions of soil, topography, rainfall, markets and even heredity and racial stocks have been the determining factors which have made dairying the premier industry in our northeastern states. In a word, the cow has gone in greatest numbers where there were large sections of land

suited for pasture but not for a more intensive agriculture, and any extensive scheme of dairy practice must recognize this fact.

It is true that the changes and advances of recent years have made pasture of relatively less importance than of old, but nevertheless the annual revenue derived from these old hillside pastures is a vast sum. For example, the preëminent month of all the year for milk production is June, and the tremendous flood of milk which each year almost inundates our manufacturing facilities and demoralizes our markets is produced wholly from pasture. Our fathers expected a cow to derive her entire living from the open fields from the middle of May until the last frosted grass of late October was closely bitten off. We of a wiser generation have come to understand that there is only a month or two in the year of really good pasture. Progressive cow-keepers almost universally supplement the grass after July 1st with grain, or better, with liberal feeding of silage stored the previous September or else with fresh-cut oats and peas in mixture or other soiling forage.

Pasture is at once both the cheapest and most expensive of feeds—cheap because the cow gathers it herself and because we usually set a low value on the land where it grows, and yet expensive as the total nutrients to the acre of pasture are so small as compared with those secured from more intensive cropping systems. It requires an acre of

the very best or two of fairly good pasture to feed a cow for the summer months and even then she will not be really fully fed after midsummer. On the other hand, it is quite usual and feasible to grow fifteen tons of silage corn to the acre or enough to furnish the main roughage requirements of three cows for the full feeding period of two hundred days when they get no food outside. When fields are steep and rock-strewn, we may still rely on a primitive pasture husbandry for a large part of our summer feeding, but it is a wasteful and extravagant method where lands are level, fertile and easily tilled. This does not alter the fact that there are very many farms whose prosperity is bound up with their pasture areas.

If we study the question, we cannot escape the conclusion that the value of our great pasture resources is declining with the years. This decline is not rapid and perhaps it may be so slow that the owner fails to be really aware of it, but if he compares the carrying capacity of a pasture now with its ability many years ago the downward tendency becomes evident. As farmers we have been very slow to realize that permanent pastures, like all other lands, need fertilizers and care. We have been quick to agree that land which is plowed and sowed and harvested by a machine needs manuring, but there has been a widespread yet mistaken notion that land lying in pasture will improve under opposite treatment. There is abso-

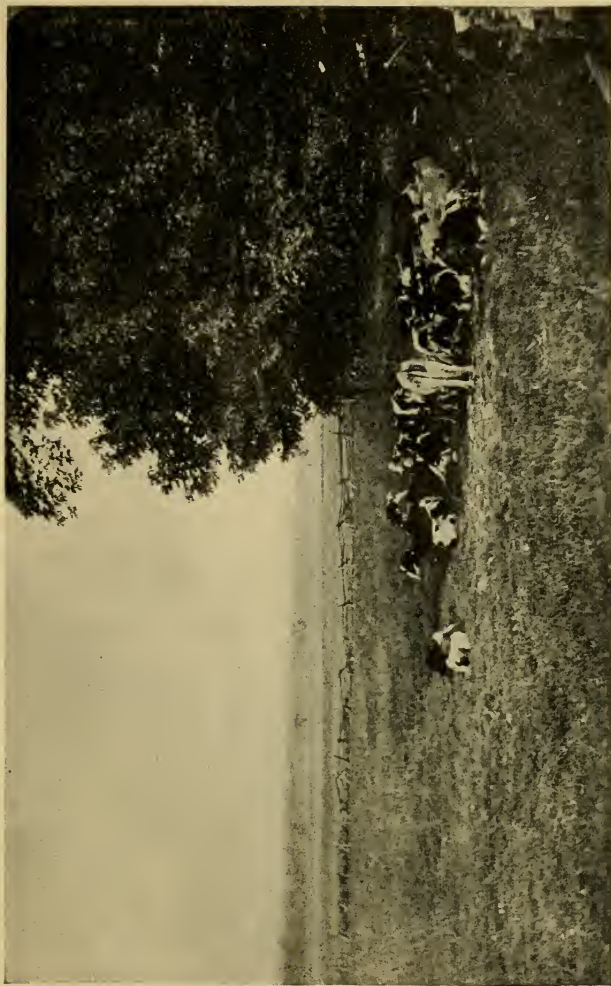
lutely nothing either in theory or practice to justify this belief. It is true that the total quantity of plant-food in all good soils is very great; yet it is not unlimited and it cannot be subtracted from every year for generations without some day approaching the end of abundance. There are permanent pastures where in many cases for a century the cows have been carrying away everything that grew and where there has never been any pretense of returning either fertility or grass-seed. The owner now wonders vaguely why that old hill does not seem to feed as many cows as it used to in grandfather's time. Of course, the argument is that while the cow takes everything off the land, she immediately returns her manure in liquidation of the debt. This line of reasoning is very faulty because some of this fertility is permanently lost to the farm and some of it is redistributed to other areas. Mere pasturing does not constitute soil conservation. When we remember that each ton of milk contains, say, twelve pounds of nitrogen, four pounds of phosphoric acid and four pounds of potash, and that these old pastures have been furnishing scores of tons of milk annually for generations, and when we add to this the much more serious loss due to other causes, we see that our old pastures present a very serious problem in soil depletion.

In general, these old worn fields are to be treated in one of three ways. Those reasonably free of

large stones and trees and level enough to admit the use of modern farm machinery ought to be plowed and, for a season or two at least, put into the regular rotation of the farm. A pasture that can be handled in this way does not constitute a real problem.

There are other fields too valuable to abandon but not practicable to till. These should be helped out with applications of lime, acid-phosphate and grass-seed—never forgetting the grass-seed—because pasture failure is not a question of depleted fertility alone, but is also due to the fact that the grass plants have died out and there are no new ones to take their place. Grass plants do not live forever, any more than do the trees in an orchard, and the only method of renewal that we know is scattering grass seed in early spring. Much has been said about this, and many kinds of seed have been suggested; but we may at least remember that the ideal pasture is a mixture of blue-grass and white clover; so whatever else we do, let us not forget the “grass that made Kentucky famous” and the plant which is said to furnish two-thirds of the commercial honey crop of eastern North America.

Another class of so-called pastures ought never to have been cleared of forests in the beginning. They have in them no possibilities to justify the expenditure of either labor or fertility, and the quicker Nature takes them back to her kindly protection, the better. With them, the best policy is



IV. At Noon.—“An hour or two later the cows will be lying down, often closely bunched together, and in hot weather they are wise enough to select the shady borders of the wood.” See page 40.

frank abandonment, with forestry. Perhaps a generation yet unborn may cut a crop of lumber from them two or three centuries hence.

There are some very familiar and commonplace objects and scenes in whose very nature there inheres an indefinable charm which we cannot explain or analyze and which yet has a very real and distinct value in life. To this quality we sometimes give the name of romance or sentiment. Doubtless the ability to thrill to this unexplained force varies in different individuals and is aroused by different objects, yet every one must acknowledge to some extent the sway of these intangible forces. Our literature is filled with the efforts of men who have tried to express the emotions they have felt when in the presence of that which appealed to them. Men cross the seas that they may stand in the presence of the mementoes of departed civilization, "Old, forgotten, far off things and battles long ago." Yet I doubt whether anything has in it more of this mystic appeal than the life of old farms as expressed in pastures with bright brooks and spreading trees, and cow-paths worn hard and sunken in the turf.

Gray's *Elegy in a Country Church Yard* is by common consent the one almost faultlessly perfect pastoral poem of our English tongue, and when the poet wished to convey the thought of peace descending with the sunset like a mantle over a lovely summer land, he hit on that line whose cadence

once heard must ever linger in our hearts, "The lowing herd wind slowly o'er the lea." Just on the side, I am inclined to question the accuracy of the poet's observation. In America, at least, cattle do not spend much time lowing when at pasture. On the whole they are silent beasts, whereas sheep bleat long and loud under the slightest disturbance or excitement. It is true that the cow separated from her calf (more especially if reminded of the separation by a painfully full udder) will sometimes low (in the speech of the farm, "beller" or "bawl") most persistently. So also, if a part of the herd has broken out into a forbidden field, those still left behind will frequently lift up their voices in frenzied inquiries as to just how it happened. A high spirited uneasy bull confined in a stall may make himself a nuisance by "the mimic thunder in his cry" as he roars out his challenge to his imaginary rival, but, on the whole, the contented cow is dumb.

"Wind slowly o'er the lea," however, is good poetry and correct zoölogy. The old migratory instinct of the wild cow still survives and a herd ranging in a good sized pasture covers it rather widely and systematically under a recognized leadership. A herd will commonly feed for a few hours until full, and then lie down in a fairly compact group to ruminate, and after an hour or two, apparently in obedience to a common impulse, they will get up and start for another part of the field.

In these short migrations it will be noted that certain individuals are nearly always at the front, while others quite as surely trail along behind. When thus "going somewhere" they are fond of walking single file as their well-defined, hard-beaten, and often somewhat sunken cow-paths attest.

As commonplace a thing as a cow-path, by the way, is really a record worth study and musing. The same path is followed year after year, and if obliterated by plowing and later the field is again returned to pasture, it will be reestablished following almost exactly the same course. The explanation is simply that the cow is a past-master in the engineering art of choosing the easiest grade between two points. Emphatically she does not go over a knoll, she goes around, and one can only wish that the pioneers who were responsible for the roads through our hill country might have had just a little of this good cow sense. The cow does not stick to paths when in a hurry or urged on by a driver, but they make use of them when on their leisurely journeys. Sheep, by the way, have this same habit of wandering in beaten trails. I do not know that the most enthusiastic lover of the cow will contend that she is remarkable for her intelligence. She has neither the spirit and courage of the horse nor the love of mankind that marks the dog, nor the devotion to locality as distinguished from attachment to persons that distinguishes the

cat, and I am afraid the common barnyard variety of hog is her intellectual superior. This is as it should be, for the extreme dairy "temperament" is characterized by placidity, not to say a phlegmatic disposition.

The modern dairy cow is a very artificial creature who by long centuries of environment and selection has come to have a stomach capable of digesting unbelievable quantities of food, and an abnormally developed mammary gland that may secrete milk enough for three or four calves, while at the same time she has very largely lost her old-time keenness of hearing and scent. She remains, however, a creature of habit and an excellent judge of meal time, without the necessity of observing the sun. If she knows that there is a little handful of meal ready in her manger, she will be waiting at the bars to meet you at milking time. So also, the cow with an uncomfortably full udder comes to understand that relief awaits her at the hand of the milker, and so she learns to present herself for his attention. After all, man is not the only animal who is most strongly appealed to through the stomach.

In all the year there is just one perfect month for cows to pasture and that is June. Then the grass is lush and abundant, and if there be a cow heaven it must be typified by a pasture field in June when she lies knee deep in verdant fragrant grass with the sunlight flooding the land and the

pasture brushed with light and shadow, as the fleecy clouds drift across the sky. With July the grass becomes less abundant and palatable, and then begins the plague of cattle flies and lesser insect pests which sometimes make August a month of almost maddening torment and seriously diminish the milk-flow. With the coming of the first sharp frosts the insects largely disappear, although they seem particularly savage in their attacks when aroused during the heat of some of those wonderful belated summer days that fall in early autumn.

It often happens that the aftermath may be grazed in September and early October with most excellent results so far as the cow is concerned, although the practice is bad from the standpoint of maintaining productive meadows. Most of us who are cow-keepers, however, succumb to the temptation to follow this easy practice. Some years when we have a warm moist fall, we may lightly graze the winter wheat or rye with little apparent injury to the crop. This lush delicious forage is unsurpassed,—possibly unequalled among all feeds. It will never fail to stimulate the milk-flow in the most astonishing way. However, as October draws on, the grass becomes short and frosted and less nutritious and the wise dairyman will usually be content to have his cows almost on full winter rations by the middle of that most glorious month.

Doubtless it is true that pasture will be an ever

decreasing factor in our scheme of dairy industry. We are told that it is very much wiser and more progressive and better all around to grow soiling crops and cut and carry them to the cow in the barn. One may deliver quite a fine sounding lecture on the economic advantage of soiling cows. But I am glad that there are so many farms where cow-pastures can never pass. The rich corn-belt farmer will let his cows drink water out of an iron bowl in the stall or out of a concrete watering trough where water is pumped from a driven well by a gasoline engine. But my dream-farm will always have old rocky hillside pastures, threaded and laced with cow-paths where old trees cast deep shadows and little ravines with thickets make caverns of shade, and cows drink out of little bright running brooks and stand at the bars until the children come home from school to call them to the barns. And I like the unremembered Harvard student who made a verse about it thus:

“She stood at the bars as the sun went down
At the close of a beautiful summer day;
Her eyes were tender and big and brown
Her breath was as sweet as the new mown hay.”

VI

CONCERNING OLD STONE WALLS AND COWS AND OTHER THINGS

THE final test to be applied to any type of farming is the kind of rural civilization that is nourished by it. Every one with capacity to call up visions of bygone things, and who has been so blessed in childhood and youth as to have known the life of a well conditioned farm, will possess within himself a treasure house of halcyon memories. And every one will visualise a different picture of many diverse elements, yet each of them at heart will be very much the same for each will glow with the perennial magic of the Land.

The old man whose locks are thin and white will sit in the sun and close his eyes and hear again across the years the ring of the whet-stone on the steel and the swishing music of the swinging scythe, or he will see the rhythmic sweep of cradlers laying the long swaths of wheat and other men following them to bind the sheaves with bands of twisted straw, or he will remember again the bubbly sound of milk being drawn from full udders into foaming pails and the muffled gurgle of the old dash churn.

Then too, there will come to him memories of snowbound days and the sound of beating flails on threshing floors and the thud of the loom and the whining song of the spinning-wheel beside the kitchen fire—for all these forgotten things were on our farms within the retrospect of many living men.

And to the man from our corn-belt states will come pictures of a fat and fertile land where the sun comes up, not over wooded eastern hills, but out of a sea of grain and runs his course and drops down and is lost in corn-fields and meadows. Boyhood memories to him will be of long straight corn rows under August sun and the clack of the grain-binder and the snarl and whine and boom of the great steam threshing-machine and men going back and forth across the fields to husk the corn when autumn frosts grow sharp. These he remembers and many other things. And yet other men whose happy fate it was to live in our fat Ontario Shore country will see orchards flowery in May and great heaps of red and russet apples beneath the trees, glowing in October days, or will behold again the gathering of purple grapes when the air is heavy with the fragrance of the vine and the land is full of joy, and for him these horticultural memories will be the best in life. But I am persuaded that to no one else can come so many visions as to the boy of the dairy farm.

For I see an old red barn and beyond the barn

an orchard of gnarled and ancient apple trees which great grandfather planted when he looked out on life with sunny eyes a hundred years before. This orchard had always blooms in May and always there were apples from August until the last hard winter fruit was gathered in. There were Ox apples and Peggy Sweets and Hooks and Goodyear Pippins and Long Stems, and other sorts unknown to any pomologist save the farm boy, and their flavor and their fragrance will never pass. Beyond the orchard is a lane with stone walls on either side and walnut trees and wild beasts of the forest—chipmunks and chattering red squirrels and even woodchucks seeking shelter with shrill whistles of fright. And then at the end of the lane is yet another enchanted land—a grove of pine trees which dropped down pungent scented cones and whispered and sobbed even on quiet sunny days, and which, on windy evenings, when I was late with the cows, made a great solemn sound like the sea surf trampling on the sand.

Nor is this all, for beyond the pine grove are more walnut trees and great umbrella elms and maples from which to make sugar in the spring. There is a stream which is bright and clear and makes a pleasant babble in May and early June, but grows lazy and feeble as the summer wanes. If you lie prone on the little plank bridge (as I do still) and gaze steadfastly into the pool beneath, you may see darting minnows and dace and even

suckers, and these fishes years ago were the finny leviathan of the deep. Then across the brook and running up against the "mountain" to meet the woodland are fifty acres of pasture—a land of trees and rocks and little ravines and old stone walls mostly fallen down. Here the cattle of Hillside Farm have come to pasture for all its history and may, I hope, for generations yet to come. Always in the speech of our farm it has been designated as "across the creek," meaning thereby a region—and always for me it was an enchanted land. Is it not a priceless heritage for a boy to have the privilege when the sun is low, of going through scenes like these—to climb the hill and call the cows and send them splashing through the brook and then on up through the grove and lane and orchard and to the barn, and after milking to take them back again and leave them keeping watch under the stars? On such things as these was my boyhood fed and my little clear-eyed son also knew all these enchantments.

You may not judge a farm or determine its value by the familiar standards of acreage or fertility or topography or access to markets. You may not reckon its desirability even by the social character of the rural community of which it is a part. Three things there are which must go to make up my dream-farm. First, it must be a place where there are animals as well as crops, for the greatest interest in country life can come only from breath-

ing moving things. Of all our animals, no other has so much of contact with human life and of the poetry of the ages as the dairy cow. Secondly, this farm must lie in the Hill-Country so that for the boy there may be rocks to climb and woodlands to explore and little ravines to wander in and great peaceful hills to which he may lift up his eyes and purple distances across which to gaze. And thirdly, this farm must be in the old agricultural East with a continuity of history—a farm to which has come the glory of the years, where men and women have lived and wrought out their lives and been gathered to their fathers. There is in truth something stirring, something epic, in the pioneer setting up his home on the forefront of civilization. I am told that men come at length to love the limitless prairie and its clear distances and its blowing air. But when I see my ideal farm it is always with barns and drowsy cows, and it will lie in the lap of the valley where the summits of the hills are wooded and blue and far away, and it will be an old farm so that the folk who dwell there will speak of things in terms of generations instead of years. And I confess that while good farming bids us have new barns that are white within and gleaming with paint without, yet I love old spreading barns with swallows under the eaves and colonies of doves within the gables. And I like farm-houses, good sized and suggestive of generous life but not too spick and span. For all

worthy old houses are thronged with ghosts—ghosts of happy bridals when a young man and a woman stand, with clasped hands and their eyes solemn with love and the wonder and the mystery of it all. There are ghosts of infants haunting dim upper chambers with memories of hush and expectation and then of joy because a child is born into the world. Then there are other and more somber ghosts telling of how the master of the farm full of days and honor was ready to leave the home, and how the masters of neighboring farms have come in with solemn manner and carried him first to the old church and then to the burial place to mingle his own with the family dust.

Old farms gather to themselves what only the years can purchase—traditions. There are traditions of disaster or of success, stories of the lean years when hail swept the farm in July or when the corn frosted in August—tales of the fat years when the wheat at harvest (as once in many years it did) stood so thick and strong that on the great billow of bowing heads the men laid the cradle and it did not fall to the ground. Many are the stories such as these which cluster around old farms.

Perhaps if there is any object which represents the very essence of farm sentiment, it is old stone walls. There is plenty of utility but very little sentiment in barbed wire. You cannot sit on a

barbed wire fence. You cannot even moralize on it. You avoid it and go around on the other side. It may have an air of smart newness but nothing more. A stone wall is lovely in decay. It is always a text-book of geology, and it is a sure foundation for dreams and memories. I wonder whether I could love a farm that had no stone walls. There is a sort of artificial beauty in a carefully trained hedge beside a velvet lawn, but there is genuine poetry in a moss-grown and tumbled-down stone wall in a pasture, especially if there be a cow-path beside it. A stretch of such wall suggests a volume of farm history.

So while a stranger or my friend sees only some acres of grassy hillside with old trees and rocks and ancient walls, I see more. I see a stalwart pioneer chopping out a place for the home and the log cabin rising in the clearing. I see the first wheat crop growing bronze and golden with blackening stumps amid it like tiny islands in a yellow sea. I see the cabin become a home because there is a woman happy in her toil and sturdy children playing by the door. I watch the years slip past and the domain of the farmer broaden as he pushes the forest further back from his hearth-stone. I behold him and his sons and his men and his ox-team—always the ox-team—as he clears the land of stones and piles them up into walls, monuments to his time. I see him through the rich years of his prime while his family is growing up, wres-

ting always with the primitive herculean labors of the pioneer, and then one day I see an old and time-worn man with a form built for strength but very still, carried out on his last going, and I see two of his sons take up the work where he laid it down, still clearing the land and building always more walls.

I confess that with us building stone walls is attaining the dignity of a lost art. I do not think this is because we are sluggards but rather because there are so many mills drawing wire and such wonderful mechanical fingers weaving it into ready-made fencing at very moderate prices a rod.

But in the Hill-Country those long gray lines of piled-up stone represent a very important part of the epic labors of the pioneer. I believe that the toil invested in this particular farm activity in the northeastern and New England states during the last three hundred years would in the aggregate exceed that involved in building the Panama Canal or our transcontinental railways. It was accomplished by men who counted not the hours and who labored with enthusiasm because they felt that theirs was a goodly heritage.

The pitiful fact about it all, however, is that very often this has proved unrewarded toil. It seems to me that there was something fine about these earlier generations of men—something that we have lost. In the Hill-Country of New York and New England where land values are low and

agriculture is decadent, there are so often stone walls laid by some man whose heart beat high with hope and who wrought at his work with conscientious care because he felt the artist's pride in his labors and deemed that he built for children's children. I hope that he laid down his good gray head at the last secure in his faith in the land he owned. But his son could never know his father's steadfast faith. He knew that once the fertile lands of the great corn-belt states began to pour their agricultural wealth into the world, the old régime in the East must pass forever. The opening up of the Mississippi Basin marked the end of an era in much of the old East, and one of our yet unsolved problems is the readjustment of the economic and social ills that followed.

I am thinking now of an old farmstead which is locally famous for its walls. It was only a poor thin farm at best, skirting the narrow valley of a little creek and running far up against the steep and rocky hillsides. It is such a farm as can never give more than narrow opportunities and then only as the result of grinding toil. Yet on this farm a man spent a long life, and when he died, he left it fenced by high, smooth, straight stone walls. It seems pathetic that a man should so—as we may be tempted to say—have wasted his life. Yet perhaps for him there was compensation in his work. He was a patient sober man of character and ideals. I know that men called him a good

neighbor. I know that according to his vision he loved and labored for the tiny country church. We cannot tell but that he worked out what was for him a sound and satisfactory philosophy of life as he patiently and skillfully piled stone on stone. But he is gone, and strangers carelessly till his loved acres, and the walls are falling down with the years and no man rebuilds them, and therein lies the pathos of his story.

This much remains, however, that a stone wall can never become common or mean. While it stands, it is a monument to the industry and abiding faith of a strong man, and even when it falls it is a part of the landscape and not a scar on it. Gradually Nature hides it beneath shrubs and running vines, and slowly by geologic law it sinks back into the bosom of the earth from which it came.

Some things in especial measure breathe the romance and poetry and magic of life on the land. Such are rows of weather-beaten droning beehives under gnarled and ancient apple trees, and running streams with cows standing knee deep in clear pools and long shady lanes with many beaten cow-paths, and boys calling the cows when the sun is low, and sunken mossy stone walls, and these last are the best and richest.

VII

THE COW TRIBES

IN those far-off centuries when herds of wild cattle ranged through the forests of northern Europe, the individuals were presumably very much alike in type, size, and color markings. It seems to be a law of biology that when any species of plant or animal exists for a long period of time under an unchanging environment, a general uniformity of type results. For example, among wild deer, the American bison, robins, chipmunks or woodchucks, with rare exceptions, every individual of a species is so like every other member that one exact zoölogical description suffices for all. On the other hand, when the environment, or the daily life conditions, is changed, immediately the tendency to mutations is exhibited, the appearance of individuals possessing new or unusual characters. The cow has been wonderfully altered under domestication, partly because new traits and characters have come unconsciously in response to new surroundings, partly because her master and owner has encouraged and preserved these new developments by keeping and rearing especially

the calves of those cows that, judged by his standards, seemed to him best or most desirable.

In discussing the theory of breeding and the results that have been attained, we have always assumed that these changes have come about almost wholly through the conscious selection and agency of man. It is altogether probable, however, that a very large part of the modification of our domestic animals has resulted from a natural biologic selection rather than from the deliberate methods and plans of the breeder. An excellent example of how Nature works (and sometimes contrariwise) with man in his breeding operations is the little Kerry cow or the tiny Shetland pony. These animals are practically dwarfs, not because their owners have systematically selected the offspring of the smallest mothers, but rather because of a law that runs true throughout all life. The law may be stated thus: "Where the food supply is scanty and uncertain, the size of organisms tends to decrease."

In any case, there are on our American farms today about twenty different breeds of cattle which are distinguished from each other not only by size, form, or color markings, but more remarkably by functions as well, and yet all of them must acknowledge the wild cow of Europe as a common ancestress.

The larger part of the story of the breeding of the cow is lost in the unwritten past. Certain it

is that in the days when man was still a nomad with his herds and long before he had any advanced civilization or written records or even traditions of his work, the cow had already been greatly modified from the wild form and very distinct breed types had arisen. With all our modern science and biological theories, we must confess that long ago there were simple-hearted unlettered pastoralists who, nevertheless, were constructive breeders. Within the last two centuries a race of English and Scotch farmers, Thomas Bakewell, the brothers Charles and Robert Colling, Thomas Bates, Thomas Booth and his sons John and Richard, and Amos Cruickshank, proved to be men with a genius for judging and selecting animals and endowed with a patience and persistency of purpose which enabled them to accomplish much in that scientific art where haste counts for nothing. The first and perhaps the greatest of this line of breeders was Bakewell (1725-1795). He pursued the improvement of cattle, horses, sheep and swine with vast enthusiasm and with a success that in his own lifetime was recognized throughout England. He seems to have possessed an almost uncanny skill in his selection of animals for mating, and he boldly practiced and attributed much of his success to his use of the principles of close inbreeding in order to fix desirable characters.

After all, however, there is hardly a breed of cattle today that represents the deliberate crea-

tion of any man or group of men. Our modern contribution has been in the improvement of types already established and in the keeping of exact records of ancestry and production through the various registry associations and herd-books. As elsewhere in our agriculture, we have only builded on the foundations laid by forgotten men.

It has sometimes been held as a reproach to our new world agriculture that we have originated and developed very few distinctively American breeds of domestic animals. This statement is not true regarding swine, for our most popular breeds, as Duroc-Jersey, Poland-China, Chester-White, Cheshire, and others, are strictly of American origin. Also the light fast type of harness horse is largely an American product. On the other hand, all of our many breeds of sheep are old European strains unless we assume that the fine-wooled sheep, the Merino, has been so modified under American conditions that it deserves to be ranked as a native breed. Every breed of cattle, with the exception of the little known French-Canadian and two or three very unimportant polled types of older breeds, are of European origin.

As a matter of fact, the very many diverse families of cattle in Europe represent not so much a definite conscious effort to build up a strain according to certain preconceived ideals and standards, but rather they stand for races that have



V. ALERT.—The old plank bridge in the Hillside Farm pasture.

been developed within limited geographical ranges largely because there has been so little communication between different sections. It has been said that almost every English shire had its own peculiar breed. This could never have occurred in America where there is a great inter-state cattle trade which insures a very general distribution and exchange of breed types over the entire country.

There is nothing occult or mysterious about the establishment of a brand new breed of any of our domestic animals. Some one may have in mind certain functions or form or more likely merely fanciful characters or color not possessed by any breed and which he thinks are worth perpetuating. Probably he will own or have in mind certain individuals that approximate the desired type. Our farm animals are rather plastic anyway, much more so than the wild forms. A few generations of careful selection and mating together with the culling out of those specimens that fail to be in line with the desired forms, will suffice to give them a certain uniformity and fixity of type. He may then interest some other men in the same project, incorporate as an association or club, adopt a set of rules and standards, appoint a secretary to be the official recorder of data relative to pedigrees and other matters, begin the publication of a herd-book, and a new breed is launched on the world. If in addition to this, those interested can

promote the sale of their animals at substantial prices, the success of the new venture is assured. Such fiat breed creation is occasionally pursued among our farm animals and very frequently in the case of poultry. It must be said that such efforts serve no useful practice and should be discouraged. We have now all the types of farm animals that can be of any real use. A considerable proportion of those we already have exist mainly for the purpose of winning premiums at fairs and selling stock to those misguided agriculturists who continually seek some new thing. It will certainly be wiser to spend time and energy on further improvement of our standard types rather than to seek to add to their number.

It is rather interesting and surprising to note that as far as the exact recording and registry of pedigrees is concerned, the systematic improvement of the beef breeds considerably antedates that of dairy cattle. The oldest live-stock registry in the world is the Shorthorn herd-book, the first volume being published by George Coats of Yorkshire, England, in 1822, and authentic private records of Shorthorn pedigree date back as far as 1750. If exact geneological records extending across many generations are the test, some families of Shorthorns are the aristocrats of the bovine world because the herd-books of the other breeds were founded much later. The first Hereford herd-book goes back to 1846. The oldest American live-

stock registry is the Ayrshire record established in New England in 1863. The Jersey and Holstein records were begun about 1872 and the Guernsey in 1877. The herd-books of the minor breeds are of still more recent origin. The whole usefulness of the system of pedigrees and registration depends on records rigorously supervised and honestly kept and which are correct to the best of human ability. In the end, the whole system rests on the conscientious honesty of the individual breeder. The temptations and opportunities to substitute and to falsify records in various ways are great and detection is well-nigh impossible. Occasional scandals have been brought to light, but, on the whole, the number is few and the associations have dealt severely with the guilty. There is no reason to question the essential correctness of our live-stock records.

The breeds of cattle are usually classified into three groups: (the special beef kinds, the special dairy breeds, and the general or dual-purpose sorts.) The theory regarding the last is that they will give fairly profitable returns as dairy animals, and in addition their male calves will make good feeding steers, while they themselves will make a fair carcass of beef when their dairy days are over. The best comment on this theory is that not one of the so-called general-purpose breeds has ever won any wide popularity. Probably the nearest approach is in certain strains of milking Shorthorns.

(Of our nearly twenty breeds, only eight can be regarded as important so far as numbers are concerned. The four beef breeds that really compete for supremacy in the corn-belt country and that furnish the T-bone steak and prime ribs of beef for a hungry world are the Shorthorn, Hereford, Aberdeen-Angus and Galloway. There are four great special-purpose dairy breeds, all widely known and possessing individuals of the highest excellence. These are the Holstein, Jersey, Guernsey and Ayrshire.)

✓ The Holstein, coming from Holland, is pre-eminently the great milk breed, her particular characteristic being the ability to give large amounts of milk containing a rather low percentage of butter-fat. Under the conditions and basis of payment that prevails in the liquid milk market, this big black-and-white cow threatens to drive other breeds from the field. She has, on the whole, remained especially the cow of the practical working farmer rather than the rich man's hobby. She has large size, vigor, hardiness and ability to utilize profitably great quantities of rough forage; and while her milk may lack the percentage of fat suitable for the most discriminating markets, she is all in all the most popular breed in the world. Perhaps we may paraphrase the famous expression regarding the Concord grape and say that she is the cow for the millions.

It is remarkable that a tiny group of islands in

the English Channel should have given to the world two of its most widely known races of cattle. It is said that for centuries no foreign cattle have been imported to these islands and this natural isolation for a great period of time has resulted in two breeds, the Jersey and the Guernsey, which are of a very distinct type. They are alike in that both give milk containing an unusually high percentage of butter-fat and, especially in the case of the Guernsey, with an abundance of yellow coloring matter (lactochrome), but in conformation and general appearance the two breeds are not closely akin.

The Ayrshires from southwest Scotland, Robert Burns' country, are in character, size and quality of milk intermediate between the Holstein and the Channel Island breeds. They have been distributed over almost the whole dairy world and have never lacked for warm admirers. The breed has some individuals that are excellent examples of dairy conformation, and they are renowned for their perfectly shaped udders; yet they seem never to have attained as wide popularity as the other breeds. Possibly this may be because they are a little on the order of general-purpose dairy cattle. It is sometimes stated that no other cow will give as good returns from the grazing of steep and rocky pastures. The Ayrshire has been especially popular in the cheese districts of Jefferson and St. Lawrence counties in New York.

A true breeder of beef cattle will not be in-

terested in their dairy qualities beyond the point of insuring that the dam will give enough milk to rear a good calf by suckling. The conformation and temperament which give a heavy loin and a meaty thigh, together with early maturity and the tendency to accumulate body fat, is directly antagonistic to great dairy performance. The story comes down to us how Booth, the great Shorthorn breeder, developed a strain of cows in which the milk-making function was almost lost, and in his stables a calf stood between two cows because one could not properly support her calf. When he was an old man and showing visitors through his stables, it was his pleasure to walk down the long alleys behind those great mountains of flesh and slapping their broad rumps cry, "Gentlemen: What does a few quarts of milk from a cow amount to anyway?"

A man's success or failure as a dairyman emphatically does not depend on his choice of a breed, assuming, of course, that he chooses one of the special dairy kinds. The different individuals of a breed differ far more from each other than do the breeds as a whole. It is not too much to say that the breed is relatively unimportant as compared with markets, soils, rations and stable care. It is of supreme importance, however, that he have good individuals of some breed, and possibly even more, that he believe in and love his business and be a student of it.

Nevertheless, it is possible to lay down certain principles that may be useful in helping one to make a choice of some breed to which to devote one's energies. If a man is producing market milk under the usual commercial conditions and basis of payment, particularly if it be a market which buys on the basis of moderate costs rather than the high quality of the product, then the black-and-white Holstein will probably be best suited for his purpose, especially if his farm is fairly level and fertile and his pastures not too scanty. The Holstein cow was developed on the best pastures in the world where "when she wanted a bite of grass, she got a whole mouthful." When it comes to climbing steep and rocky hillsides and wandering far to crop a lean herbage, the Holstein is handicapped as compared with the lighter and more active breeds.

On the other hand, for the economical production of butter-fat rather than fluid milk or for the supplying of a discriminating market milk trade, one of the Channel Island breeds will probably be a wiser choice.

The Ayrshire must not be forgotten in this list. In her adaptability she really falls midway between the other two classes. Wherever the Scotchman has gone into the far corners of the earth, he has taken his cow, and at her best she is worthy of the race that created her.

VIII

THE REARING OF THE CALF

AS A rule, it will be best if the calf can be born in the autumn, September or October. There are sound reasons of good dairy management why this is usually best. For one thing, it brings the largest production of milk during the winter months when prices are much higher than in summer. This plan also allows the cows to stand dry and hence to need very little attention during the stress of midsummer farm activities, no small consideration as every dairyman knows. Then again the fall-born calf is likely to receive better care and attention and to make a more satisfactory growth. The spring calf, even with the best of intentions on the part of the owner, is too likely at times to be neglected in the rush of soil preparation and haying and harvest. The greatest enemy to thrift in a calf is not fairly low winter temperatures, but rather the flies and heat of July and August.

If the weather is warm and dry, there is no better place for the calf to be born than on a clean grassy pasture. Usually the other members of the herd will display very little interest in the event.

During much of the year, however, a roomy well-bedded box-stall should be provided. The period of gestation in cows is about 285 days, but a variation of two weeks in either direction is not uncommon. Just a day or two preceding parturition, certain marked physical evidences appear which enable one accustomed to observe cows to know that calving is about to occur. The most marked of these is the relaxation of the pelvic ligaments and the abundant secretion of milk in the udder. Twelve or twenty-four hours previously, the teats will fill with milk to such an extent as to become somewhat firm and rigid and the coming of the calf will then not be long delayed. Rather close watch should now be kept in order to be prepared to render assistance in the occasional cases in which it is needed. Ordinarily, however, the youngster comes into the world with very little trouble, and if the mother lives up to the customs of her race she has within an hour very thoroughly cleaned her baby with her tongue (the bovine equivalent of a bath), it has taken its first meal from her full udder and curled up and gone to sleep. Maternity among cows seems to be a passing incident rather than a great event.

In the typical scheme of beef production, there is really no such problem as rearing the calf. It is merely allowed to remain with its mother and she brings it up strictly according to ancestral training and generally avoids all trouble of indi-

gestion or other ills. But under the approved management of the modern dairy herd, all this is changed. The calf is torn from its mother forever when only twenty-four or forty-eight hours old, is taught to drink its milk out of a tin pail instead of nursing from its mother's udder, and after a few weeks at longest it is fed skim-milk instead of the rich creamy fluid that its dam secrete. It is no wonder that indigestion is sometimes a veritable scourge among young calves. The real marvel is that they do not all die. We do incredible violence to every principle of calf hygiene. Nature provided that the food for the calf must be very slowly drawn from the mother and abundantly mixed with saliva in the course of suckling. Moreover, it was always at exactly the correct temperature and measured up to the highest standards of bacteriological cleanliness, and was taken in small quantities many times a day. We cause the calf to dump a twelve-hour supply of milk into its stomach at one time in a few big gulps, and, moreover, the temperature is generally too low. Very frequently the feeding pail is seeded with every imaginable variety of germs. In addition to all this, we feed too much. The calf will thrive better if it is never allowed to stuff itself to repletion, if it is fed only enough milk so that it is still a little hungry and eager for more. Perhaps the nursing calf may be allowed

to gorge itself with all the milk it can hold, but this means disaster when artificially reared.

The gospel of calf feeding may be stated in this way: Feed moderate quantities of milk at frequent intervals at about blood heat and out of a clean and scalded pail. Probably the ideal would be to feed a teacup full of milk a dozen times a day, but three or perhaps four times is about the limit under the conditions of practical dairy management. The amount that may be safely fed will vary through wide limits according to the size and vigor of the calf, but for the first week from two to four quarts a day will be enough. For the first ten days or two weeks of the youngster's life it should be fed whole milk, that is unskimmed milk, fresh from its mother or some other cow. The more vigorous and hearty the calf, the sooner we may begin to substitute some skim-milk until at three to five weeks old it will receive skim-milk only.

After the calf is a few days old, it should have before it a little lock of bright early cut hay, preferably clover or alfalfa, and also a box with a handful of ground grain. A mixture of equal parts of wheat middlings and ground oats, together with ten to fifteen per cent of oil-meal (ground flax-seed cake) will make an excellent grain ration. It is surprising how quickly a vigorous calf will begin to nibble a little hay and lick

at the meal, and at two weeks old we may find her busily and happily chewing her little cud quite after the manner of her dam. Once a calf begins to eat freely of solid food the dangers of indigestion and bowel trouble are largely over. Milk may then be fed within any reasonable limits that the supply will permit, and no other food equals it for rapid growth and for putting an animal into the best condition. Another matter easily forgotten and yet important is to see that there is provided an abundance of bedding. Calves will not thrive in a damp and dirty stall.

The autumn-born calf will be ready to go to pasture as soon as the grass is plentiful the next spring. Some grain and shelter from flies during the first summer is the ideal, but it may not be practicable to provide these, especially if we are dependent on back or outlying pastures.

In the case of pure-bred, high-class animals, when it is desirable to secure the greatest possible growth and when economy is a secondary consideration, it may be wisest to barn-feed the calf for the first year and not depend on pasture. It must not be forgotten, however, that this is an expensive system and on most farms we should expect the calf to get its living to a considerable extent from pasture. The spring-born calf, however, would better spend its first summer in the barn, because if turned to grass when only a few months old the withdrawal of the milk, together

with the heat and flies, will result in a practical cessation of growth and possibly permanent injury. There is no period when liberal feeding pays better than with young animals. One of our agricultural barbarisms that still survives is the idea that young heifers may properly "rough it" through the first two years of life. This is a great mistake, because the first requisite of a good dairy animal is the ability to utilize large quantities of food, and we should lay the foundations for a vigorous digestion by liberal feeding during early life. In a general way, the grain food for young animals should be of some bulky nature rather than of a heavy and concentrated type. Nothing will be better than the old stand-by, a mixture of wheat bran and ground oats. Wheat bran is especially indicated because of the large proportion of phosphorus and lime which it contains. These materials are the basis of the bones, and it is very desirable to encourage skeletal development in the young heifer rather than excessive fatness.

If well grown, the heifer may be bred when fifteen to eighteen months old. She will then drop her first calf at two years to twenty-seven months of age. We are often told that "Nature is a wise Old Dame" and that she manages everything about right. Unfortunately when left to herself, she does not always manage this matter well, because very frequently the heifer will become a mother altogether too young, when not yet half grown, the

result being that she gives but little milk and will be very late in coming to maturity. At the same time, it is generally agreed that to defer the first calf too late is a mistake. The heifer's business in life is to bear calves and yield milk, and it is well if her development along these lines begins before she is too mature.

IX

✓ THE CARE OF THE MILKING HERD

SCHOOL-BOY debating societies have long wrestled with the time-honored query as to whether the pen was mightier than the sword or water more destructive than fire. So men of more mature years have debated which was more important, to have good cows or to have them well cared for. It is breed *versus* feed. The obvious reply is that both must go together if the business of dairying is to be profitable. Men do not, however, always act according to this truth. Sometimes we find herds of excellent breeding where the food supply and comfort of the animals are neglected. On the other hand, it is not unusual to find men who are good caretakers but who forget that no amount of good food can secure high production from an inferior cow.

The care of cattle may be classified under: (a) Factors of comfort, such as comfortable stalls, protection from inclement weather, suitable stable temperatures, water supply and protection from insect pests; (b) factors of the food supply; (c) factors of dairy management.

Good dairymen have always recognized that ease and comfort and content on the part of the cows are great factors in profitable milk production. The ideal would be an individual box-stall, say ten feet square, for every cow where she might freely move around or lie stretched out at perfect ease while she chewed her cud and manufactured milk. Unfortunately this system occupies barn room so lavishly and uneconomically and is so inconvenient and extravagant of bedding if decent cleanliness is to be maintained, that it is almost never followed in large herds as a regular practice. However, nearly all breeders of pure-bred cows who are making advanced registry records and wish to secure the last possible ounce of milk without counting the cost, find that they attain the maximum results by giving each cow the freedom of her separate box-stall. Of course, on every dairy farm there ought to be a few box-stalls for cows needing particular attention and especially for those about to calve.

The cow is probably less sensitive to fairly low temperatures than we have sometimes been led to think. Thousands of years ago her ancestors passed the fairly severe winters of northern Europe with no shelter other than that afforded by the forests. As long as she has a dry coat and a dry bed, she probably prefers a cool rather than a warm and stuffy stable. Rain worries her not at all until the cold storms of autumn come on, when she

should be housed at night or in very unpleasant weather.

The old idea of dairymen was that the cow should be given an opportunity for plenty of exercise around the barnyard throughout the winter. Today practice has veered to the other extreme, and it is not uncommon to find cows that are never released from the stanchion from November to May. It may be a question for debate as to the ultimate effect on offspring and constitutional vigor, but there seems to be no doubt that cattle will give excellent dairy production under such close confinement.

Unquestionably, flies and other insect pests are a very serious drawback to cow comfort during midsummer and early autumn. They are annoyed by several species of flies and gnats. It is interesting to note that about the year 1890 the northeastern states received a new fly pest never observed until that time. This was christened the Texas horn-fly, the popular belief being that it was an importation from that state. It has thriven marvelously since its introduction and seems to have displaced or driven out what we very unscientifically called the "old-fashioned cow-fly."

The bot-fly or ox-warble lays its eggs so that they are taken into the stomach of the cow. Later the tiny larva burrows through the body of its host, making a long migration until it establishes itself beneath the skin of the back where it passes the

winter, to emerge nearly a year later as a big fat repulsive grub. Big as they are, they do not seem to cause cattle any particular annoyance. It may be added that their life history as worked out by the entomologists is one of the most marvelous of Nature's strange miracles. The bot-fly seems to be quite local in its distribution. On the home pastures at Hillside Farm we never find it, but cattle sent to an outlying pasture two miles away are sure to return bearing a crop of bots that will become prominent in late winter.

Occasionally the torment from insect pests becomes so maddening that the whole herd will start on a gallop across the field, each cow carrying her tail aloft like a banner. These rushes are apparently a desperate effort to leave behind or shake off their tormentors. Fortunately we are able to give cows some measure of relief by lightly spraying the body, especially the parts that cannot be reached by the tail, once each day with some one of the numerous commercial fly repellents. An expenditure of fifty cents a cow each season for time and material will do much to mitigate an annoyance that is very costly both in milk and flesh.

Flies disappear after a few sharp frosts, but in winter their place is taken by two or more species of lice. These vermin are no respecters of persons and are sometimes troublesome in the best stables. They may become so bad as to cause cows to rub raw and bleeding patches on the skin in the effort



VI. AT PASTURE.—“What is so rare as a day in June?”

to relieve the intolerable itching and sometimes may hasten the death of unthrifty and poorly fed calves. Any number of powders, ointments and washes are recommended as remedies, and most of them are efficient if used persistently.

Another factor of comfort is the water supply. It must be confessed that cattle are in no way fastidious as to their drinking place and often seem quite as well pleased with a green and stagnant pool as with a running brook or clear spring. However, a good water supply in winter is of the utmost importance. If the supply is a trough in the barnyard, it should be warmed enough to keep it free from ice. There are many inexpensive types of water-tank heaters to choose from. It will, however, be a sound investment and not an extravagance to provide a system of automatic individual drinking buckets for the stable. A cow will get along by drinking a great quantity of water (often from 70 to 100 pounds a day when on dry feed) once or twice a day, but when forced to do this she is doubtless thirsty much of the time, while if she has it available she will take a sip or a few swallows at very frequent intervals. Milk is about 87 per cent water, and there is no other constituent that we can provide so cheaply. However, both statute law and ethics decree that it can be added only through the cow.

Many volumes have been written concerning the feeding of animals and the current literature of

the subject, both in popular periodicals and in research publications, is well-nigh unlimited. Therefore, a few broad generalizations will be sufficient, without any attempt at discussion.

Wise feeding of the cow must consider three associated factors. Food must be abundant, palatable, and chosen from such sources and in such relative amounts that it will supply the different classes of nutrients in such proportions as will best minister to the needs of the animals.

This is a simple definition, but to measure up to its requirements involves practical experience, technical training and a large proportion of good cow-sense.

Sometimes we talk very technically and at much length about the "balanced ration." What we mean is a ration which by its chemical composition and make-up is fitted to supply all the requirements of the animal. It is now just about a half-century since the principles of quantitative chemical analysis began to be applied to feeding stuffs and to the animal body, to the milk and also to the wastes or excreted food residues. Some one then asked a most simple and natural question, "Ought there to be any particular relationship between what we feed an animal and the product that we expect to derive from the food?" and thus this discussion was begun and surely has never been allowed to lapse.

The broad idea of the balanced ration is funda-

mentally sound, but we make a great mistake when we try to convert it into a rigid mathematical formula. Successful feeding of the animal is not only a question of correct relative proportions of protein, carbohydrates and fat, but also of economy measured in cost in cents each day. It is more a question of palatability than of the absolute best theoretical ration. Animals at different seasons and localities have had to adapt themselves to very wide variations in diet, and fortunately their requirements are rather elastic. Study of tables of composition and digestibility are suggestive, but we must not forget the individuality of the animal. The more we consider this topic of feeding, the more clearly we come to understand that the best rations are not compounded in the laboratory but in the stable. A cow must eat to the very limit of her digestive powers if she is to do her best work. She must gorge herself "as full as a tick," and she will not do this unless her food fulfills her ideas of toothsome-ness. Rations may be skillfully compounded, if you will, exactly to conform to the Wolff-Lehmann or any other standard, but they must also be compounded with experience and common sense and a close and sympathetic study of the likes and dislikes of the cow.

There are two fairly distinct types of dairying, so far as management is concerned—"summer" and "winter." The dairying of our fathers was almost wholly of the former type. It was planned

to have the cows come fresh in April and May, so far as possible, and to depend almost wholly on pasture for production. The barn was not regarded as a place to make milk; it was merely a device by which cows were maintained alive until spring. Until a generation ago this was about the only dairying known except within the milk-shipping radius of the towns and cities where there was an insistent demand for milk throughout the year.

For many years an active educational propaganda has urged the wisdom of producing milk mainly in the winter rather than the summer months. In the main the arguments are sound. Winter prices are substantially higher, and it brings the larger part of the care of the herd in the time when the farm labor schedule is a little less strenuous than at seed-time and harvest. Doubtless, thoughtful dairymen will more and more come to consider the period beginning in autumn as the best dairy months.

There is also the question as to what disposition shall be made of the milk. The market for milk is constantly and rapidly broadening and there are now a surprising number of distinct outlets. These are market milk (that is, milk to be consumed in the natural state), butter, cheese, condensed and evaporated milk, powdered milk, malted milk, ice-cream, milk in combination with chocolate, and a number of very special uses such as prepared in-

phants' foods and various proprietary milk beverages like koumiss and bulgarzoon. In addition, there are a large number of commercial chemical by-products of skim-milk.

Of these uses, market milk and butter are by far the most important. Milk for cheese-making includes not only the common American or Cheddar cheese, but also a very great variety of so-called "fancy" or "soft" cheeses, such as Philadelphia Cream, Neufchatel and Roquefort. It is not the purpose of this little book to attempt any discussion of manufacturing methods.

It is safe to say that in the South and in all sections of the country with a large urban population, milk is usually worth more to sell as market milk than it is for manufacturing purposes. However, the great dairy districts remote from centers of population must still depend on the commercial manufacturing establishments for their markets. Thus, seven states produce more than one-half of our total butter.

In considering the question of markets, one point deserves to be emphasized. It is this: The dairyman who can so arrange his business as to retain the skim-milk on the farm may not get as many dollars this month or this year, but he will have the satisfaction of feeling that he can grow calves and pigs which means the maintenance and up-building of the dairy herd and the conservation of soil fertility. This is the factor that must underlie

a really enduring business. The writer lives in a dairy locality within two miles of a particularly advantageous market for liquid milk, and almost without exception the milk of this entire region goes to supply New York City. We almost alone have still held to the old farm custom and continue to skim the milk at home and to sell only cream and pork and to raise all our promising heifer calves. The immediate returns may not be as large as if we should join the morning procession of milk rigs, but we believe that the future justifies our plan.

Sound dairy management is a matter of productive cows, convenient, sanitary and comfortable barns and stables, corn-fields and silos and hay from the grasses or better from the legumes. We do well to maintain the herd as far as possible from within our own fence lines, but in addition we shall probably find it necessary to purchase moderate quantities of protein concentrates.

If we milk more than ten or fifteen cows, it will be wise to add the milking machine to our equipment. That it is a most successful saver of human labor no longer admits of debate. There is the disadvantage, however, that we do largely lose contact with our cows and the good custom of weighing milk and keeping records is almost certain to fall into disuse.

X

THE HEALTH OF THE HERD

THIS little book makes no pretense of being in any way a treatise on veterinary medicine, but merely proposes to mention rather than discuss a few of the most important ailments of our dairy herds. Many of the diseases of humans have their almost exact counterpart among bovines. A number of specific infectious diseases are confined to cattle and at least one, anthrax, is of peculiar interest, because it is communicable to man, not frequently with fatal results. The five outstanding troubles that to some extent are always with us and that we can hardly hope to escape sooner or later are calf scours, epidemic or contagious abortion, parturient apoplexy or in the language of the stable "milk fever," bovine tuberculosis and garget.

The first two are not well understood, and while the literature of these diseases is most voluminous, we seem to have no general agreement as to either the exact cause or the specific preventive measures to be adopted. Many investigators have come to think that the two troubles have a common cause and that a calf may be carried to full term and be

born in apparently good condition and yet perish rather promptly because of germs from a diseased mother. Certain it is that from time to time in our best cared-for herds, scours has proved a veritable scourge that neither painstaking attention nor the best veterinary skill has been able to arrest. The specific disease is not to be confounded with the chronic indigestion and diarrhea resulting from improper feeding and which will ordinarily be cured by removing the cause.

Contagious abortion is without doubt the most serious disease of dairy cattle in America. Not only is there loss of production and frequent unthrif and barrenness as a sequel, but in addition we have the loss of the offspring, which in the pure-bred herd is the most serious aspect. Nothing is more disheartening than to see calf after calf born prematurely until perhaps hardly one remains. There is little doubt that it is an infectious germ disease, but as for its control there is a feeling of discouragement on the part of those who have had the most experience. One fortunate fact stands out, that, like many germ infections, it is self-limiting and one attack confers at least partial immunity against further ones. Probably it is safe to say that few herds escape contagious abortion, especially if there is some buying and selling of cattle. When a herd has heretofore been free, the initial attack is likely to be especially virulent. Usually an aborting cow will retain the fetal

membranes, and some of the best students of the question insist that this condition can occur only as the result of a specific germ. The owner will find abundant discussion and advice available, and he may at least rest assured that if he will keep up his courage, care well for his animals and feed abundantly, he will gradually gather a herd that is at least partially immune so that a premature calf will be the exception instead of the rule. The writer has had considerable experience as a layman in the effort to control this disease, and he has no desire to offer specific advice or to combat any system of treatment.

Milk fever or parturient apoplexy, while a once dreaded scourge, may now be fairly described as of mainly historical interest. The simple and remarkably efficient method for its cure is the one great outstanding triumph of veterinary medicine. Until less than a generation ago, the cow just easily delivered of a calf, more especially if she was a heavy milker and in the best condition, would be noticed to stagger, within a few moments go down, throw her head around against her side, breathe slowly and noisily, become unconscious and in the greater number of cases die within twelve to thirty-six hours. Every dairyman who had good well-fed cows came to know these symptoms only too well. Of course we called the cow doctor and, according to the rules, he poured down the unconscious animal purgatives and aconite, but

we usually buried her next day. It is true that much could be done by preventative measures. It was known that milk fever usually attacked cows that were well fed and fleshy, the precise condition in which intelligent dairymen try to have their cattle at freshing. We were advised to give her only a restricted diet for two weeks before calving, but to maintain a cow in this manner is totally opposed to all sound tenets of good dairy management. Due to the great discovery of veterinarians we may now feed her well, and when the first premonitory symptoms are noticed the udder is pumped full of sterilized and filtered air until it is tense and drum-like and almost invariably within a few hours she will be apparently as well as ever.

Bovine tuberculosis is by far the most talked-about of all cattle diseases, owing to the fact that many well-informed sanitarians believe that it may be transmitted to the human race as well. The occurrence of tuberculosis in cattle has been recognized for many years, but so long as we were dependent on physical examination for its detection, no real progress toward eradication or control was possible. The discovery of tuberculin and its application in various forms to the tuberculin test has given a simple, inexpensive and on the whole remarkably accurate diagnostic agent which permits the detection, not only of advanced but of incipient cases as well. If bovine tuberculosis were confined entirely to the lower animals, it would not

attract any very special attention, and it surely would not be possible to enlist both state and federal aid in a far-reaching campaign for its eradication, in which not only is there supervision of means of stamping it out, but also provisions whereby to a great extent the public assumes the financial burden involved in the destruction of the infected animals. Whether or not bovine tuberculosis is transmissible to man is one of the perennial battlegrounds of the biologists, but the idea is at least very widely credited and explains in large part the peculiar interest which city boards of health have displayed concerning this disease.

Once well established in a herd, tuberculosis is very serious from the economic side, apart from any questions of public hygiene. If the infection becomes general, there will be the unsatisfactory evidence of unthrifty calves and young stock and from time to time an occasional cow will go down with generalized "T.B." In any case, the public and the more progressive breeders are so aroused over the question that we are rapidly approaching the time when all purchases of cattle will be conditioned on passing a tuberculin test. Solely from the standpoint of satisfaction and dairy production, no man can afford to keep an infected herd and if we grant its transmission to man the case for its eradication becomes infinitely stronger.

Another trouble that is always with us and the loss from which runs into incalculable sums, sur-

passing perhaps even epidemic abortion, is garget and udder injuries of one kind or another. There may be mechanical injury to the udder or inflammation as the result of excessive or improper feeding or a specific infection may be passed from one cow to another. The latter type is commonly very much more severe and often treatment seems of little avail. As a result, every herd of much size will have spoiled udders, sometimes only one, sometimes two or more quarters missing. A bad case of infective garget may lead to the actual loss of a large part of the udder by sloughing off. In this case, there will be severe constitutional disturbances with high fever and great loss of flesh. A good cow with only one teat gone will probably be worth keeping, but when half of the udder is lost it will be better to salvage her at the butcher's unless she is especially valuable on account of her offspring. Losses from garget are likely to be greatest in the best herds, as the cow with an intensely developed milking tendency seems to be most liable and also because the high feeding with concentrated protein grains practiced in the best stables acts as a predisposing cause. It may be added that care, patience and prompt use of some simple treatments will go far to minimize the losses.

The American dairyman is very fortunate in not having to reckon with some very serious cattle plagues which are found in Europe and other parts

of the world. Among these are pleuro-pneumonia, foot-and-mouth disease and rinderpest. The two former have at times attained a foothold on our shores but by a vigorous system of quarantine and the destruction of all infected and exposed animals they have been absolutely stamped out, the resulting saving to American live-stock interests being beyond all calculation. Some of these temporary invasions have cost large sums, have involved the enforced slaughter of some very valuable herds of pure-bred cows, have entailed private financial hardship and have aroused most bitter animosity against the authority charged with the enforcement of the control measure; and yet the somewhat violent means adopted have been justified a thousandfold. Several times within a generation foot-and-mouth disease has thus been extinguished. It is a testimony to what can be accomplished by trained animal sanitarians armed with power, but it is perhaps too much to hope that like results can be attained with maladies like abortion and tuberculosis where the symptoms are slow in development and may lie long concealed.

No man will go very far in the business of dairying without suffering losses from disease. He may not have many mature animals die, but calf scours, abortion and garget will always be present and sometimes will take their toll. Nor need he feel, therefore, that he has been ignorant or careless in his management. Undoubtedly more intensive

feeding, closer housing and a congested cow population has tended toward the increase of bovine disease. As an offset to this is the far more intelligent and rational treatment than in the old days. Some loss is a part of the dairy business, but skill in feeding and care and the eradication of the feeble and diseased animals will be the best measures to minimize these losses.

XI

THE DEPRECIATION AND THE RENEWAL OF THE DAIRY HERD

DAIRYING would be a much less complex and exacting business if it were not for the constant necessity of replacing the cows which for one reason or another drop out of the herd. This shift and change in the make-up of the working herd is much greater than one would expect until one considers the various factors involved.

The cow is fairly long-lived, although not equaling the horse in this respect. Many cows are still useful at thirteen to fifteen years of age. The records of registry associations show that an occasional individual is still bearing young and milking up to twenty or more years. The bovine wonder of the world so far as age is concerned was the cow Old Grannie recorded as No. 1 in the Aberdeen-Angus herd-book. She is credited with dropping twenty-five calves, the last one in her twenty-ninth year and finally dying at the (for cows) ripe old age of thirty-six. Probably if it were desirable to retain cows to extreme age, many would reach a quarter of a century. Nevertheless,

rather careful studies in New York and Minnesota covering some thousands of cows indicate that the average individual reaches an age of only between eight and nine years. This figure does not mean that cows die at this average age but rather it represents the age at which they are removed from the herd. Low-grade beef rather than natural death is the fate of most cows. Inasmuch as a cow must be at least two years old before she "comes in," her actual period of usefulness does not average more than seven years. It also means that for each seven cows in the herd it will be necessary each year to raise at least one calf to take their place. There is really a rather rapid shift of our bovine population.

It should be remembered that these estimates are the average for a large number of dairies, but it does not follow that the same will be true on any particular farm. The number of cows removed from the herd will vary widely with circumstances and with the policy pursued, but in general the more active and enterprising owners will have the largest "turn-over" of cows because they will be more energetic and persistent in culling out undesirable individuals and will not wait until a cow reaches extreme age before disposing of her.

There are a number of reasons why some 14 per cent of our dairy cows must be replaced each year. Disease and accident always take their toll, but

this is not the most important factor. It has been shown by investigations covering several thousand cows that the actual annual loss by death was only 1.2 per cent, and these figures were the same in New York and Minnesota.

Mechanical injury to the teats and udder, such as having a teat crushed in the stable by the foot of another cow or tearing the udder on a barbed wire fence, occasionally leads to the loss of a teat. Infective garget is a much more serious trouble, nearly always leading to the entire loss of the quarters affected. In either case, the dairy usefulness of the animal is diminished and results in its disposal for beef.

Failure to breed or barrenness is very common and of course renders the cow valueless except for slaughter.

Probably the largest single cause is poor production, the animal being turned to the butcher because she fails to give milk enough to justify her existence. It may be added that even more cows ought to be eliminated for this same reason. We cannot well over-emphasize the slogan that the path of the unproductive cow ought to lead straight to the butcher's block.

Finally, there is the question of wearing out through old age. A cow really fails largely because her teeth become poor and she is handicapped in gathering her food at pasture and to a less degree in the stable. The teeth of a horse continue to

grow throughout life and the older they are, the longer and more protruding they become. Cows have front teeth on the lower jaw only and these frequently drop out and in other cases are worn off to the very roots. It is perhaps not far wrong to say that a cow is no older than her teeth. In purchasing a cow of somewhat doubtful age, an examination of the mouth is the first necessity.

The depletion of the herd by death and accidents and the necessary eliminations for other reasons constitutes an "overhead" charge which is sometimes forgotten but which is really a most serious economic factor. The ultimate end of the cows that prove to be failures as producers or that meet with some accident or disability is slaughter. Dairy-cow beef is so low in price that the value of a worn-out or disabled animal is commonly only from one-third to one-half of her price if sound. Considering all this, it seems certain that in calculating the balance sheet of a dairy business, it will be necessary under the best management to "charge off" each year at least 10 per cent exclusive of the salvage value of the animals disposed of, a depreciation charge much higher than obtains in some other types of agriculture. If this estimate is wide of the mark, it is at fault in being too low rather than too high.

Broadly speaking, there are two methods of maintaining the numbers of the herd. One is merely to purchase animals to replace the fallen



VII. THE HILL COUNTRY.—“But the hills are good hills, nevertheless, great furrows from the glacial plow.” See page 141.

from time to time as the necessity arises. The dairyman who is selling liquid milk and who, therefore, has no skim-milk available will often, perhaps usually, find this the wisest plan. This is especially true if he is located on high-priced land and has no rough outlying areas where heifers and dry stock may be cheaply pastured. It is emphatically true, however, that the purchase plan is by no means ideal. The buyer will always be asked to accept animals which are really the rejects and discards of other men. Also, he can never escape the danger of buying tuberculosis and epidemic abortion together with its sequel, barrenness. He stands more than a fair chance of acquiring hard milkers and kickers and fence jumpers. He will abundantly exemplify the ancient maxim of the law, "Let the buyer beware." As an offset to these disadvantages is the fact that to rear a calf on whole milk and purchased foods and pasture it on high-priced lands will almost always cost more than to purchase a fresh cow in the markets. The only reason why the dairyman so situated should raise a calf is the expectation that it will make a better cow than he can buy.

In the vicinity of cities are numerous examples of what might be called "high pressure" dairying, the cows being bought when new-milch, heavily fed and milked and then as soon as they begin to take on flesh and diminish in milk yield, they are sold for beef and a fresh cow installed in their

place. This plan involves a certain loss as between the cost and selling price of every cow handled but, on the other hand, it does away with the charge involved in feeding and caring for calves and heifer and dry cows.

But after all, for most of us, the true pleasure and satisfaction of dairying comes through the plan of maintaining the herd by calves born and reared on the farm. The dairyman who, like the writer, sells cream or who makes butter or ice-cream and hence has available an abundance of skim-milk, should by all means expect to raise all the promising heifer calves. This will of course give him more cows than he requires to replenish his herd, but there are two marked and distinct advantages. There is always an eager market at increasing prices for well-bred and well reared grade young stock and these, while in a way a sort of by-product of the business, may constitute a very important addition to the farm revenue. There is also the further advantage that, having a large number of young cows to select from, he may cull his herd more closely, retaining only the most desirable individuals and thus raising the general average of production. It ought to be written in capital letters that the most important single factor in profitable dairying is not breed, feed, methods or stable care, but efficient cows. This, to borrow a phrase from Thomas Carlyle, is the "one thing altogether indispensable." Even the most

Careful breeding does not secure continuous progress and one of the most disheartening facts is that not infrequently the offspring is inferior to the dam. The man who has heifers of his own breeding in considerable numbers stands the best chance of maintaining a high average excellency.

It has been noted in an earlier chapter that success or failure in dairying does not depend on the selection of any particular breed. Both experience and theory indicate that real constructive dairy improvement must come through the use of pure-bred sires and that, having chosen one breed, a stockman must stick to it consecutively through the years. He will soon have a herd of grades, the first cross being commonly stated as one-half pure-bred, the next one as three-fourths pure-bred, and so on. Four or five successive crosses with males of the same breed rapidly reduce the proportion of native blood to an insignificant fraction and will result in a herd which in color, size, general appearance and real dairy usefulness will be the equivalent of a registered herd, the main difference being that they can never have their names written in any herd-book nor can they be sold at prices approaching that of registered stock.

It may be asked whether there is any fundamental reason other than sentiment for the use of the pure-bred sire rather than the mongrel, that is, the animal of mixed or promiscuous breeding. The whole value of a sire depends on his ability

to transmit his characters to his offspring. To this power the biologist gives the name "prepotency." This power or ability varies greatly in different individuals and the history of breeding is really a chronicle of the influence of certain famous sires who have been prepotent to an unusual degree. It would be easy to multiply classical examples of this fact. There is the Jersey bull, Stoke Pogis 3d, sacrificed for beef while still young before his value was realized, yet it is said that every daughter of his that ever was tested made a record that would have entitled her to admission to the Jersey Register of Merit. There is the stallion Hambletonian 10 who, during a period of twenty-one years, was the progenitor of 1287 foals, a large percentage of which were notably fast. This was true not only of Hambletonian himself but of his sons as well, so that by common consent he stands unapproached as the foremost horse in the history of the American trotter.

It is this mysterious quality of prepotency that above everything else is to be desired in the sire. Unfortunately not every pure-bred animal possesses it, but there is abundant evidence to show that the animal which for a long period has been bred within certain blood lines without admixture of diverse strains is more likely to be prepotent. On the other hand, the cross-bred or native or mongrel may be and frequently is of excellent individuality, but they are surely much less likely

to be able to transmit these good qualities to their offspring.

Not every dairyman need expect to become a breeder of registered cattle. Indeed, after many years of agitation and propaganda, less than 2 per cent of the dairy cows of the eastern United States are pure-bred. However, every dairyman who expects to rear calves to replenish his herd ought either to own or else pay the service fee of a good pure-bred sire. While a certain rather small percentage of bull calves of fashionable breeding and born of dams who have been admitted to "Advanced Registry," that is, dams whose high production has been officially demonstrated and certified, sell at high prices, plenty of calves of excellent breeding, especially when owned by the less widely known breeders, can be purchased at prices quite within the reach of any dairyman.

XII

THE JUDGING OF COWS

A VERY eminent teacher of animal industry has said that he could learn more about a cow by weighing her milk for a week and testing it with the Babcock test than he could by a life-long examination of her according to any scale of points—a conclusion in which any good dairyman will heartily concur. But on the other hand, we may not always be able to weigh and test her milk and, moreover, there are certain accepted standards of beauty and form in cattle, certain requirements as to individuality insisted on in the show-ring and the sales pavilion. No matter how much attention is paid to official testing, we shall never cease to exhibit cattle for prizes at the fairs and always our agricultural college boys will continue to organize judging teams to compete in the art of placing animals according to certain agreed standards of form, color, carriage, qualities of udder and skin and hoof and horn. This judging and scoring of animals is a fine art and one that deserves to be encouraged by lovers of good live-stock and by our teachers of animal husbandry. It is

true that the price at which dairy cows sell depends largely on their Advanced Registry certificate, *i.e.*, the officially certified records as to their ability to produce pounds of milk and butter-fat. It is also true, however, that really high prices will never be paid for cows that carry misshapen udders and sloping rumps and winged shoulders. In other words, men who love cattle demand not only ability to give high production but good individuality as well.

There are two different ideals in judging cattle. Unfortunately, almost every breed at some period of its development has suffered because the men setting breed fashions have followed some personal fancy or fad or character which had no particular connection with usefulness, dairy efficiency or beauty. For example, not so long ago Jersey breeders laid great stress on the importance of solid color together with a black switch and tongue characters that can have no possible relation to dairy temperament or capacity. Judging cattle according to merely fanciful standards or points that have no bearing on the question of production is very superficial. Fortunately, on the whole, there is less of this judging than there was at an earlier period of the pure-bred business.

On the other hand, as representing the seasoned experience and observation of many handlers and students of dairy cows, there has come a substantial agreement concerning certain external charac-

ters to be determined not only by the eye but quite as much by the touch, which are the usual (but by no means invariable) indications of dairy temperament and capacity.

Every breed association has adopted its own official score-card or scale of points. These will vary one from the other in minor questions of coloration, shape of horns, quality of coat and other non-essentials, but in fundamentals they are very much alike, showing that the scoring of cattle is more than a mere empirical art. The score-card is very useful to the student or judge because it brings the various qualities of the animal to his attention in an orderly and systematic sequence. The reader will find it very interesting to study the official scale of points of any of the dairy cattle registry associations or the card prepared for the use of students by our animal husbandry teachers in the agricultural colleges, but these occupy too much space to be reproduced here. It will be noted that there has grown up a fairly large half-technical half-slangy vocabulary of the judging ring.

In judging dairy cattle, one point universally emphasized is that the cow (and to a less extent the bull or calf) should show the wedge shape or, as it is sometimes put, the "double wedge form." This means that the hind quarters, or more strictly the pelvic arch, should be relatively broader and more massive than the chest. This conception may

be visualized thus: If imaginary lines are drawn from the extreme outside points of the hip-bones to the outside points of the shoulders and then continued forward, they should meet at a point some little distance in front. The same is true of lines along the spine and belly, although it will be understood that this can hardly be demonstrated with the exactness of a problem in Euclid. Let it be said, however, in the most emphatic manner that a good cow is wedge-shaped not because she is narrow in front but because she is broad behind. The distinction is most fundamental. If the wedge shape is secured only at the expense of a restricted heart and lung cavity, it is all wrong. A roomy, wide-spread pelvis is necessary to shelter the organs of reproduction and to give easy room for the attachment of a capacious udder. This udder cannot be easily swung if the cow has thighs like a beef steer, hence we look for "cat hams" and an animal "high in the twist."

Most score-cards ask for a cow with a back "level from the point of the withers to the setting on of the tail-head," or similar phrasing. This means that a sloping rump is not desirable. This is perhaps a rather "fancy" point but a sloping rump is very often correlated with an udder hung too far forward and with poor rear udder development.

A cow "down in the back" or "sway-backed" is undesirable from the viewpoint of beauty or symmetry and it is always preferable to have the back

level; yet it must be admitted that this particular fault seems to be very common in cows of marked excellence. There may be a special reason for this because a great abdomen and a heavy udder, both so necessary for a good cow, tend to put a downward curve in the spine, especially with advancing years. In this case the popular "good top line" and real dairy performance may be to some extent antagonistic.

The ribs should be well sprung, giving a barrel-shaped chest and enormous abdomen, because if a cow is really to be a high producer she must first of all have a great stomach that can hold and digest large amounts of bulky food. This reminds one of Napoleon's famous dictum regarding the common soldier, "Away with brains. Give me guts."

The withers should be rather thin and sharp, the very opposite of the beef type. Heavy withers are usually correlated with a thick hard hide, a heavy tail and a generally beefy conformation. The vertebræ should be large and prominent to the touch, showing mainly that they are not padded and covered with fatty tissue. Stripped of their flesh, the skeletons of the milch cow and the typical beef cow can hardly be distinguished by the best trained anatomist, but the dairy cow is more inclined to be "raw-boned" because she puts her fat in the pail instead of using it to upholster her framework.

We must shun the hard, thick, inelastic hide, for

there is no worse indication. The skin need not be especially thin but it must be "mellow" to the touch, elastic and loose, so that behind the shoulders one may pick up a handful of it. This quality of being a "good handler" has always been a much esteemed character and the word was used by writers more than a century ago. Some judges place much emphasis on the color and abundance of the "secretions," meaning thereby the oily matter in the skin, the waxy material within the ear and the yellow dandruff at the roots of the long hairs in the tail. Most cows who give even small amounts of very rich milk are likely to exhibit these indications in a marked degree. Desirable characters are a bright, active, prominent eye, a lively ear, a great broad muzzle and powerful jaw, a horn not too heavy, and always an air of supple slenderness which we call feminine as opposed to the rugged masculinity of the bull.

There remains the udder, to which more points are given and on which more stress is laid than on any other one feature. It must be acknowledged that some cows which are excellent dairy animals from the standpoint of production nevertheless carry miserably misshapen udders, but this is their misfortune. A beautiful symmetrical udder is a point worth striving after. It should be "square," with the four teats wide apart but not "strutting." It should be attached far up between the thighs behind and yet be carried far forward under the

belly also. It should be "buttoned up close" to the abdomen and not swinging or pendulous, else it will chafe and be more liable to mechanical injury. It should be soft and very elastic, covered with silky hair and should fall into loose folds of skin when empty.

The milk veins have perhaps received undue attention, many holding that these are the one unmistakable sign of a good cow. We like to see them long and crooked and if possible divided into two or three branches, entering the abdomen through as many different holes or "milk wells." It is at least a reasonable assumption that the size of these veins is a measure of the circulatory activity of the udder and if so they should be a sort of measure of dairy capacity. They may be traced out on a very much smaller scale in bulls also and in this case are given considerable value. Some poor cows have prominent milk veins, but most inferior ones do not, and nearly all animals of unusual capacity will exhibit marked development in this regard.

The question may be fairly asked: "How much connection is there between conformation and performance and to what extent are these supposed indications of dairy excellence really borne out by the hard test of the milk scales and the Babcock bottle?" The writer has been intimately associated with the care of a herd for many years. He has done some buying and selling and some show-

ring judging and has tried to determine how far there is a real relation between a cow's conformation and her ability to produce. His conclusions are as follows: Some cows, too many, in fact, possess every external character that is supposed to indicate the superior dairy animal and yet seem unable to "deliver the goods." They are calculated to deceive the very elect. Something they lack, be it constitution or vigor or pep or whatever term you choose to employ. On the other hand, he has yet to see the cow of beefy build, hard, thick inelastic hide, heavy hams, thick withers, bull-headed, with a tucked up little udder and small, inconspicuous milk veins buried in tissue that by any stretch of courtesy can be called a superior dairy animal. Emphatically, dairy indications are more than skin deep. We hold to the ecclesiastical doctrine that "there are outward signs of inward grace."

XIII

THE DAIRY FARMSTEAD

IN the business of dairying three principal factors and items of investment are to be considered,—the land, the barns and the herd.

So far as the land is concerned, it has already been noted that dairying is commonly a hill-country business. Of course this does not mean that cow-keeping is restricted to this type of country or that the very best land may not be employed profitably in dairying. It indicates that much land too rough and hilly to be well adapted to the production of staple cash crops may be very well utilized in dairying and hence that industry has largely gone to the rougher and cheaper areas. On the other hand, one must not make the mistake of concluding that the cow is adapted to very poor land. She can make good use of steep and rocky pastures if they are reasonably fertile and clothed with grass, but light, poor, sandy soils, if they are worth trying to utilize at all, had better be given over to sheep. Experience in the range country of the West with a very scanty rainfall shows that on these lands the beef steer rather than the dairy

cow gives the best results. Also the dairy farm must have something besides rocky pastures. There must be stretches of meadow and areas adapted to corn for, as a rule, the man who attempts dairying as his main business without the aid of the corn plant will be almost hopelessly handicapped from the beginning. There are certain exceptions to this general statement. Some regions are either so far north or else lie so far above sea-level that the seasons are too short and cool for this heat-loving plant, and yet our native grasses are most thoroughly at home. In these localities, one may find a highly developed dairy industry without the silo.

It should be borne in mind that the cow can utilize steep and rocky hillsides to advantage only in conjunction with corresponding areas of land that are fairly free of stone and level enough to permit the use of modern agricultural machinery. Fortunately this is just the condition which obtains on many of the farms in the Hill-Country of the northeastern states.

It is, of course, utterly impossible to lay down any scheme of crop rotation that will fit all sections of the country or that will apply to every farm in any particular locality. Indeed, every farm constitutes a separate problem in farm management. It is equally impossible to say how many cows ought to be maintained on a farm of any given size because this will vary through the very widest

limits. It may be practicable under skilled and intensive agriculture on the best lands (especially if far enough south so that some double-cropping may be practiced) to approximate one cow for each acre of arable land, although this will imply the purchase of a large part of the grain food. In most of the dairy regions of the northeastern United States, a cow for each three to five acres will be a much more reliable and conservative estimate.

It is perhaps foolish to specify any farm, real or imaginary, and lay down a hard and fast system of rotation and cropping. All schemes of this character must be more or less elastic. However, as a sort of working hypothesis, we may imagine a farm somewhere in the dairy belt containing one hundred acres of cleared land. We will assume that fifty acres of this area are too steep and rocky to be tillable and hence must be used as permanent pasture. The remaining fifty acres are level and smooth enough and have sufficient fertility to make good meadow or to grow corn. How many dairy cows such a farm will support will depend very largely on the character and agricultural condition of the soil and on the skill and energy of the owner. Nevertheless, there is something like an average farm and average efficiency in management and, bearing this in mind, we may venture to make some estimates as to the productivity of this farm.

Suppose we see whether this farm is fitted to

provide at least the roughage for twenty milking cows together with the young stock and necessary horses. The farm stock will then comprise twenty cows, a bull, five yearling heifers, five calves and three or four horses.

The fifty acres of permanent pasture, if it is fairly good, ought to provide the larger part of the grazing required during the pasture periods, which is only a little more than five months. Later in the season we may supplement the old pastures by allowing the cows to graze off some of the aftermath in the meadows. The temptation will be to overdo this because, while rather hard on the meadows, it is excellent for the cows.

Corn silage is one of the very best and cheapest of cow forages and should fill a large place in the yearly menu. A cow will profitably use forty pounds of silage a day and this amount will very satisfactorily replace ten or twelve pounds of good hay. This means four tons of silage to a cow for the 200 days that she must depend mainly on stable feeding. Some silage should supplement the summer pastures in dry weather or late in the season, say a ton to a cow for this purpose, which will mean that one can feed liberally, if necessary, for six weeks or two months. It may be said in passing that a supply of silage for summer is far superior to any scheme of growing green crops to help out scanty pastures. One would better arrange for five tons of silage for each cow and some

for the heifers and even for the calves. A round silo thirty feet high and sixteen feet in diameter if well filled will hold about 120 tons, and this will be about what is required in our scheme of dairy management.

A good farmer ought to produce twelve tons of silage to the acre on the average, so at least ten acres of corn should be planted. This corn will always be grown by plowing up ten acres of the oldest and poorest meadow and it will always be followed by oats. Our farm rotation map appears about as follows:

50 acres permanent pasture

10 acres corn

10 acres oats

30 acres hay

The amount of corn required is really the key to the whole scheme. If a larger proportion of the farm were tillable, we would have less pasture and more crops.

The ten acres of oats can hardly be expected to yield more than 500 bushels and this will be far above the average of the country, but fortunately dairy farms generally yield more than average crops. After we have fed the horses and poultry and saved oats for seed, there will not be many left for the cows. In other words, we must expect to buy most of the grain feed.

The thirty acres of hay (the ten acres of new seeding being mostly clover) ought to give forty-

five tons of hay. This will be enough for the horses and cattle, supplemented as it is by silage.

This is a sort of empirical made-on-paper scheme but it is at least the outline of a cropping system which is fundamentally sound and which will work out well in the dairy belt of the northeastern states. At the same time it may be greatly modified. If the farm is so fortunate as to lie in the limestone country where alfalfa is at home, the area of meadow may be reduced and two crops of oats may be grown in succession before re-seeding. If this is done it will double our acreage of oats and we may expect to have enough to help out considerably in making up the grain ration. Sometimes if hay is scarce, an acre or two of very rich land sown to millet and cured for hay may take the place of two or three times that area of ordinary meadow. It may be the wisest plan to follow the practice of some dairymen who have found that the easiest way to grow grain is to plant potatoes and exchange them for mill feed.

In a general way over most of the dairy belt of the United States, the business is founded on three great crops, (1) grass and the hay legumes (alfalfa and the clovers), (2) corn to be harvested mainly through the silo, (3) and a small-grain crop, oats, or better, a mixture of oats, barley and peas sown together.

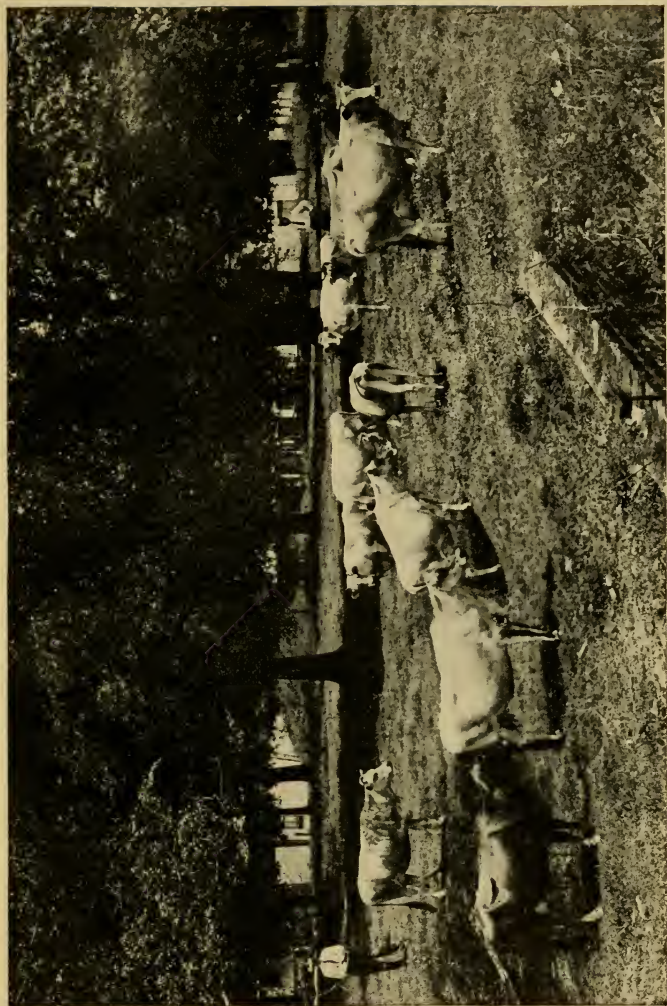
It must not be forgotten that the largest single factor in crop production is the weather. There

ought to be a margin of safety between what the live-stock requires and what the farm will ordinarily produce. The effort to keep all the cattle that the farm can maintain in ordinarily productive years will be sure to meet with lean years when our plans go wrong. It will be well to carry over from year to year some reserve of hay and not to keep so much stock that choice timothy hay cannot be sold, for its sale value is always far above its feeding worth.

The choice of a farm is exceedingly important and many factors must be considered. Some of these are as follows:

The soil: Is it fertile? Has it natural supplies of lime sufficient to make it easy to grow legumes, especially clovers and alfalfa? Has it the physical characters that adapt it to the true grasses? Does it need artificial drainage? Is it free from large stone so as to permit the use of modern tillage implements? Is there at least a part of it where the corn plant will be at home?

Topography: How much of the land is level enough to permit the use of the tractor and other heavy implements and to allow inter-cultural tillage without washing and denuding? Does it slope south and east or does it face north and west? The difference in the two exposures is very important. Does the tillable land where we expect to grow corn enjoy good air drainage so that there will not be frosty pockets? This may not be vital



VIII. WAITING.—It will soon be milking time.

in the South but it is important as we approach the northern limit of the corn-belt. What is the position of the buildings? Are there favorable grades for roads to bring the crops to the barn and, not less important, return the manure to the fields? Is the farm cut up with ravines or streams that will interfere with broad fields and long straight furrows? Is it possible to reach remote parts of the farm by direct routes? Is the house and barn sheltered from winter gales?

Climate: What is the annual rainfall of the locality? How is it distributed as to the seasons of the year? What is the date of the last frost in spring and the first frost in the fall? What is the mean annual temperature?

Location, markets, transportation: Is the farm near good permanent stone highways? Is it near, if possible, very near, the markets where the dairy products are to be marketed? Is it near the station from which feed supplies must be hauled? Are the market roads level enough so that maximum loads may be taken?

Water supply: Has the farm a satisfactory water supply in the pastures as well as at the house and barn? If not, is it possible to secure an abundant supply of pure running water at reasonable expense? Are there springs or unfailing streams in the pastures? We cannot lay too much emphasis on this.

Social and human factors: Are the neighbors

of the type and nationality that we wish our children to grow up among? Is there a good school? Is there a live church? Is there a community conscience and consciousness? Is there a good sized village or small city within easy driving distance by automobile? These may be intangible factors not easily translated into terms of dollars, but we cannot afford to ignore them. A man who buys a farm chooses a home not only for himself but, it is to be hoped, for his descendants as well. Broad and smiling acres and barns that burst with crops avail little if the human conditions are wrong.

A man must choose a farm not only as a place where cows may be maintained and milk cheaply produced and advantageously marketed but also as a place where he may help rear a worthy agricultural civilization and found an enduring and contented family life.

XIV

THE CONSTRUCTION OF THE DAIRY BARN

WE may have a herd of excellent cattle and a good farm but if the barns are inconvenient or poorly adapted to their purpose, the entire business will be unsatisfactory and perhaps unprofitable. Satisfactory barns are rarely made in an architect's office. They grow under the hand of the man who really knows the routine of harvesting crops and caring for cows. The country, especially near large cities, is full of so-called model farms with very expensive and sometimes very artistic barns, but most of them are models only of how barns ought not to be constructed. Under the most favorable conditions, doing the chores calls for a rather appalling expenditure of time and energy, but a poorly planned barn and stable may easily double the labor. It should be said in passing that farming is about the only business in the world at which rich men deliberately play without pretension that there should be a connection between income and outgo. Many of these model barns load every cow with an overhead charge for her shelter which, if really charged against the busi-

ness, would effectually dispose of any possibility of profit.

As for the cow herself, her esthetic sense is entirely undeveloped. Some few fundamental conditions she enjoys and her welfare demands that as far as possible these should be supplied. Her stable should be well lighted, well ventilated, reasonably warm and the stall should be bedded and so arranged that she may stand or lie with comfort. But she cannot appreciate the sanitary gleam of white tile nor the elegance of nicked stall fittings. Concrete floors and foundation, and hemlock construction above suit her perfectly.

If a man is making plenty of money in some other business and spending it on a farm, there is nothing to forbid him erecting a barn ornate enough to gratify his heart's desire. There are also some breeders handling valuable herds who have many visitors and purchasers and beautiful and expensive stables may have an advertising value that justifies the cost. However, dairying as a whole is a severely utilitarian business where the margin of profit is small. The barn and stables at best are large and important items of capital expenditure and the business demands as low cost as is consistent with convenience and the comfort and hygienic welfare of the occupants. It should be noted that the convenience of the barn and the welfare of the cattle do not necessarily go together. There are barns in which it is easy to feed and care

for the cows but where not enough attention has been paid to ventilation, lighting and comfortable stalls. More commonly, especially in the pretentious barn, the welfare of the cattle has been looked after, but that of the herdsman forgotten. One finds hay dragged long distances by the forkful through narrow alleys, silage carried in baskets from remote corners and manure laboriously removed by wheelbarrows.

A fairly standard type of dairy barn construction has now been evolved. It is a building from thirty-two to thirty-six feet wide and as long as necessary to house the desired number of cattle. The cows stand in stanchions in two parallel rows facing outward toward the air and light and feeding alleys and there will be a driveway through the center behind them through which a wagon may be driven or a carrier rolled for the removal of the manure. These general dimensions are correct. A barn narrower than this will be crowded and if wider it will be poor economy of space.

The arrangement of floor plan just indicated will be best in most cases. However, under the rather unusual circumstances when it is expected that the cows will rely mainly on green soiling crops fed in the stables, it may be wiser to reverse the position of the cows and have them stand facing each other so that loads of forage may be driven through the central feeding alley and pitched directly into the mangers. It must be

repeated, however, that this arrangement is not good so far as light, ventilation and clean stable walls are concerned, and if employed at all it must be in cases in which soiling is to be a very important part of farm practice. Outside of these rather fixed dimensions and somewhat fundamental plans, the details may vary to suit the wishes or special needs of the owner, but never under any circumstances forgetting the convenience in following the routine of caring for the herd.

A great variety of methods and devices for stalls for the cattle has been advised and patented and used to some extent, but practically all experienced herdsmen now agree that some form of swinging iron stanchion is the best solution of the problem. These stanchions should be hung with a short chain at top and bottom so as to allow the cow a certain degree of freedom and liberty of movement. Each cow will need floor space from thirty-six to forty-two inches in width and there should be about four and one-half feet from the manger to the gutter or drop, varying with the size of the cow. Various firms are engaged in the business of supplying fittings for cow stables and these carry a very extensive line comprising almost everything that can be suggested. Such manufacturers are glad to furnish detailed plans and to make estimates of cost.

Stables, even when rigid economy is sought, should be constructed with manger, gutters and

floors of concrete on the score of permanency, sanitation and even of first cost. There are many places about the stable where wood is short-lived and unsatisfactory at best.

In addition to the regular stabling for the milking herd, a liberal number of box-stalls should be provided that may be used as quarters for cows about to drop calves or for exceptionally good animals to which it is desired to give special attention. These stalls may also be utilized as calf pens. Such stalls and pens may be inexpensively constructed of wood, or, if means permit, they may be purchased ready to erect from dealers. Iron box-stalls are rather high in first cost, but they have many advantages in the way of neatness and durability.

Hay-mows should be provided above the stable and the hay dropped down through chutes directly into the feeding alleys. Most professional architects and sanitarians will not approve of this arrangement, but any one who has really served his apprenticeship around a barn will understand the simplicity and labor-saving advantages of the plan. Moreover, the objections are on the whole theoretical.

Light should be provided in abundance, the only limit being that in cold weather a single thickness of glass allows heat to be lost very rapidly and, as will be emphasized later, this is serious in severe climates.

The best ventilation will be secured by a system of intake and outtake air flues, the latter extending from a point near the floor and carried up through the upper stories to a point well above the ridge of the roof. This general plan has been rather widely popularized under the name of the "King system." It should be said that the system is rather expensive to install. Like fire-place chimneys, they have sometimes failed to act as expected, the draught being in the wrong direction. Another plan very widely used on account of simplicity and low first cost is merely to replace some of the windows with ordinary cotton muslin. This admits some light and also allows the air to filter slowly through while avoiding strong direct draughts.

If possible, a stable should be built warm enough so that it will never freeze even in the coldest weather. This is not entirely on account of the cow herself, because she is a native of rather cold climates and is probably less sensitive to low temperatures than we sometimes think. However, no item of stable comfort is more important than individual water basins for each cow so that she may help herself at any time of day or night; but this very desirable arrangement is forbidden unless the stable is entirely frostless. Freezing once or twice during the winter will ruin the whole system by bursting pipes and water basins. A stable must be very warmly constructed to remain above freez-

ing during a midwinter night when it is twenty below zero outside and a howling gale driving in its frigid blast at every crack and nail-hole. The side walls must be double with a good dead air space, or better yet, a chaff or saw-dust packing, and over head there should be a hay-mow. In addition, the ceiling should be fairly low and the stable filled with cows. The writer, living on the high lands of the central New York plateau with a rather iron-clad winter climate, realizes how much care is necessary to secure a stable in which water buckets may be installed with safety.

Always in planning a barn there will be many details to consider. Silage is heavy and must be handled in large quantities. Therefore, it is of prime importance to have the silos so located that the contents will be thrown out as near as possible to the feeding mangers.

Very often it will be wisest to have the barn built in the T or L form, the main part containing the lines of stanchions for the milking herd, while the wing may be devoted to box-stalls and calf pens and perhaps with quarters for horses. However, city milk inspectors do not approve of the very convenient feature of having the farm teams close to the cows.

When the slope of the land permits, the "over shot" type of barn with the main drive-way on the second story has many advantages. The barn of the writer has the rather unusual feature of the

drive-way on the third story, but this construction is not usually practical unless a fairly steep hill-side is available to help gain entrance. As far as possible the mows should be kept clear of all cross timbers that interfere with the free use of grappel horse-forks or slings in unloading hay or unthreshed grain.

The so-called "gambrel" or "hip" roof gives much more overhead storage room than the usual gable type and at a relatively small increased cost. Even when economy is very necessary, a first-class metal roof or perhaps even better, a slate roof, will be cheapest in the end. It may be added that a system of lightning-rods properly installed ought to enable the dairyman to rest better during thunder-showers.

XV

CONCERNING DAIRYING AS A BUSINESS

THE writer lives on an old farm in the Hill-Country of eastern New York just where the western foothills of the Catskills merge themselves with the central New York plateau. We have been farmers on this land since 1800. It is a farm that, judged by corn-belt standards, is too hilly and stone-strewn for easy or successful farming. It is a farm where the side-hill plow will always find a place and there are many fields from which the tractor and hay-loader will be forever barred. But the hills are good hills nevertheless, great furrows from the glacial plow, and the boulder-clay and limestone drift of which they are composed make a soil where grass and alfalfa and oats are much at home. The farm lies high above sea level and we do not grow corn as easily as if we were a thousand feet lower or a few hundred miles further south. More and more with the years we and all our neighbors are discovering that we belong in the dairy belt and that our best agricultural opportunity lies in the keeping of cows. From earliest boyhood my farm activities have been linked with

the dairy herd. The daily yield of cream constitutes the means by which we live, so I have in mind to set down very briefly my philosophy, my steadfast faith, concerning the business of cow-keeping.

Let it be said first that dairying is surely no sluggard's job. In all the devious ways by land or sea, in shop or mart or roaring city canyon by which men gain a livelihood, there is none other occupation so insistent, so exacting in its demands. Like Tennyson's brook, it goes on forever. There is something almost appalling or pitiful in its unending routine. I remember how my good father, noting this fact, used to quote, half humorously, half seriously, the phrase of Solomon the Wise, "For there is no discharge in this war." It is almost as regular and unchanging as the Procession of the Equinoxes. Come what may, though the heavens fall, the cow demands her usual attention. The day that the master of the farm dies, she must be fed and milked. On the great day when the daughter of the home is given in marriage, there can be no deviation. The fruit-grower or the crop farmer may labor hard but on Saturday night he may forget his task till Monday dawn. There are many dairy farms where the irreducible minimum of Sunday chores will constitute more than the eight-hour day which union labor insists leaves not enough time for rest and play. We cherish a family tradition that for more than a century there has never been a night when in our

house there was not a fire on the hearth and a light in the window, but the reason is that the exigencies of our business were such that never under any circumstances could the plant close down.

Dairying is in no way a get-rich-quick proposition. There are certain types of farming, like fruit-growing and vegetable-gardening, in which the possible value of production to the acre is very large and where a fortunate conjunction of good yields and high prices sometimes give the farmer returns that constitute the financial romance of agriculture. For example, it is possible to find instances in which peaches or onions or strawberries or lettuce have given gross returns of more than a thousand dollars from single acres. Nothing of this nature can ever come about from the sale of dairy products. Intelligently and industriously followed, the business ought generally to yield a profit, but the margin above cost of production will never be very large. The breeding of registered cattle and the exploitation of the pure-bred business is very different. This calls for judgment and skill of a very high order together with a certain gift of salesmanship and a full appreciation of the value of publicity. Some few men of great energy and special ability have made money very rapidly in this field. Selling market milk or butter or cheese will never afford a foundation for any agricultural wonder-tales.

Another weakness of the milk business from a commercial standpoint is the fact that the product must be sold as rapidly as produced and that once production is under way it cannot be arrested quickly to conform to the demands of a falling market. By aid of cold storage, butter and cheese and other milk products may be held for some months in good condition, but market milk must find its final market within twenty-four hours of its production. Save in a few special cases, the dairyman has ceased to be a manufacturer and has become merely a producer of raw materials. While theoretically at least the very perishable nature of his product has left the dairyman at the mercy of the dealer and manufacturer, yet as a matter of fact the demoralization of the milk market never approaches that sometimes experienced in fruits and truck.

One of the advantages of the dairy business is its stability. The dairyman is never caught up to new and undreamed-of heights of prosperity. It is probable that through a series of years no other agricultural product shows a curve of prices so regular or so closely estimated in advance. The rise and fall of dairy prices, with certain minor variations, is almost as regular as the seasons. Always the lowest prices of the year come in April, May and June, then start to advance and reach the peak in November and then begin an orderly decline to the low point again in April. No man

can possibly make even an intelligent guess as to the price of potatoes or apples or cabbage or onions a year from now, but we are fairly safe in saying that the price of dairy products will not vary greatly from the average of past seasons or from the general average price level of all commodities. This enables the dairyman to plan for the future with an assurance that is hardly allowed in other farm business. Even in the midst of industrial panics and crumbling prices such as has come to us in the wake of the Great War, his products have exhibited relative price stability.

There is a certain element of safety and security in our business. The dairy specialist may produce only one product, but he is surely not a one-crop farmer. Surplus supplies of hay are readily carried over from one year to another and almost never do we have a failure of all the crops of the dairy farm.

The greatest argument for the business of cow-keeping is that above any other type of agriculture it makes for soil enrichment. In America we have developed a remarkable agriculture and have made our typical farmer efficient beyond any other in the world. No other tiller of the soil anywhere produces as much food to a man (not to the acre) as does the American husbandman. We have also succeeded in wringing wealth from the soil as the development and resources of the agricultural states attest. However, we have not yet demon-

strated that our kind of agriculture can endure through many centuries. The good dairyman need have no doubts or misgivings on that score. If he carefully conserves all the manure and puts it on the fields and supplements his home-grown roughage with purchased concentrates, he may go forward in the calm assurance that where he keeps cows today he may keep still more cows in days to come. He will have the satisfaction of knowing that he will "leave the soil better than he found it" and he will be able to hand down to his children an ever richer heritage.

There remains at least one more consideration and it is a rather intangible one. Somehow or other it cannot be gainsaid that dairying makes for agricultural and community stability. Farm tenantry is in many of its aspects unfortunate and a menace to our ideal country-side development. The typical tenant has no real abiding place and he makes a crop and then moves on, seeking new fields of adventure. When a man acquires flocks and herds, he begins to strike root in the soil.

The relative permanency of dairying, the all-the-year-round character of the industry, the regularity of it, the high intelligence which it demands and the increasing value and productivity of dairy farms are all factors that give special dairy communities the best developments of our rural life.

It is mid-July. Once again we are making the hay on Hillside Farm. In the matter of hay, it is a fat year. I hardly know where we shall store the first crop, to say nothing of the aftermath. It is only twenty-seven years ago that we built what we still call the "new barn." At first it used to hold all our crops with room to spare, but it does so no longer. Any farm fully stocked with cows where much grain is purchased and where all the manure is carefully saved and wisely used, grows ever more productive. I suppose we have doubled crop production since my father's youth.

I look out across a meadow where there seems hardly room for the windrows to lie. Over there a half mile is the steep rough hill-pasture,—our "mountain." I can see the herd as the animals work back and forth across it,—blurs of yellow and white on the brown-green background. Above the upper line of the pasture the woods begin and run to the top, green and deep, wonderfully cool and refreshing to the eye. I can remember very clearly when I was sure that this horizon was the very place where the sky came down.

It is hot and bright today. I can hear the clattering song of the mower on my neighbor's farm. I can hear the shouts of our own men as they urge the straining horses to drag the heavy hayloader up the grades. Every little while—two or three times an hour when things are going well—a swaying load of hay comes up the lane and is

swallowed up within the barn. I am mowing it away. It is hot up here under the roof, as hot perhaps as in the steel furnaces where it is the fashion to pity the men who toil. It takes only a few moments to unload hay by modern methods, but it means dust and sweat and weariness.

So I am moved to a hay-mow meditation. Sometimes our business seems a curiously futile performance, like traveling always in a circle. All the growing season from April to November we toil to grow and gather the crops that shall fill the great barns and silos. And then all the remainder of the year we devote to feeding out the crops we have gathered with such pains, and when spring comes we have always what we had the year before,—an empty barn. And always in fair weather and foul we milk the cows. Does it not seem a bootless task? Sometimes perhaps I ask myself this question. Yet I remember: Take care of the soil and the soil will take care of you. For a hundred years and more my people have worked for this old hill farm, and have lived by it and on the whole it has answered to their care. A hundred years ago it sent a boy to college and it is sending boys and girls to college still. Of the by-gone men who tilled it, none ate the bread of idleness and none has known want. I like to remember that out of its soil for all those years has been nourished a wholesome civilization and a generous life.

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