

help, and to it I shall therefore direct your attention.

We said, the greatest amount of the most valuable beef and mutton in the shortest time, and at the least cost. These are the aims of the modern agriculturist, and accordingly it is with him practically a question of how much flesh can be produced per acre under the conditions of his special subject. The maximum realization of this implies a very great deal of skill, even when backed with plenty of capital, because it is not only the selection of the best kind of animals, a knowledge of their capabilities, and what foods would most surely contribute towards the result, but the being able to produce, *within his own command*, all these foods in such abundance, of such quality, and so cheaply as must support the other end of the story.

Who shall declare that this is not more difficult than the deepest mathematical problem, or less so than some other unfledged point in science?

As a business problem, it is desired to produce quantity and quality at a certain price within a given time. It is now allowed that 3 years for cattle and 1½ year for sheep should be the limit of the maturing, or it may be, the pre-maturing periods commercially. Experience is gradually confirming this, and yet science has not said whether such comparatively young flesh is as good for human food as the older products. It is likely that no chemical differences exist between two animals of precisely similar character, with the exception that one has by "pushing" been made up to 1500 lb. at two years, and the other just the same weight at three years? This is not a question of appearance, or palatableness, it is one of much higher significance—the nutritiousness and healthfulness of food for man's daily wants.

In this relation it is evident that two elements are concerned—the class of animal that by its kind will give the weight and quality, and the foods that in kind and quantity will enable the cattle, beast or sheep, to do so.

But the cost of production is, of itself, a subject of keen interest between science and practice; where it begins, and where it ends is not yet so very clear; nor do we all agree as to what it amounts to; or what, or what should not go to make it up. When the subject is one only from nature's upbuilding, as in the case of pasture, the debiting and crediting are much more simple.

In all my experience I have never seen two men agree on this uneven field called, cost of production. We could employ much discussion on the many items from birth to the time when, in Canadian practice, it is usual to put up the animal for finishing; when as we know, store cattle and sheep are considered to be worth only so much per pound live weight. My purpose will however, be better served by noting the relation of the finishing process in the stall to the cost of production.

As the result of my farm cropping, I am in possession on 1st Oct. of so much wheat, hay, straw, mangolds, turnips, peas, oats, and corn. These are required for two purposes: the maintenance of my household, and the maintenance of my farm and their connections; the one is the primary necessity, the other is but secondary in the sense of being essential to human existence. I could dispose of every particle of these products and live well, as many now do who cultivate virgin soil, who indeed cannot do better, because nature's virtues need no upbuilding; but I am cultivating old land, which like all such subjects, is now more of an agent to convey

food to plants than being in possession of food naturally for the purpose. I am therefore obliged to arrange for the return of so much of the same or other materials to the soil, in such form as experience has proved to be the most suitable for every requirement; these I need not detail here, except to note that farm yard manure of the very best character is absolutely essential to the best production of crops of all kinds; *nothing else can take its place.*

In making this fertilizer, I am concerned in three things; the kind of crop, the class of animals, and the mode of treating what the animals give me after eating the crops. It is possible I might make a mistake in the view of many good men, were I to grind and feed the wheat to cattle. Are you aware that we can produce it as cheap and purchase it in the common market at no greater cost than other things that we do feed to cattle? Linseed cake costs as much, and other grains little less. Why then do we not give this staff of life to our fattening cattle and sheep? Just because it is, comparatively, for example, one-third less valuable as fattening food, and more than one-half less valuable in giving farm-yard manure. Why, the sunflower is just as good for food, and meadow hay as good for manure-making as the grain of wheat.

In making my winter arrangements I am also concerned, I said, in the class of animals through which to invest these field products. I may want milk and growth of bone in addition to the manure. In this case experience says that the manure will come off third-rate, it is simply impossible to get milk, grow young animals, and at the same time secure first class manure. On the other hand I don't want aged animals because they would cost too much per pound, are slower at flesh-making, and practically I cannot get them in these days of high pressure.

Under all the circumstances of the case then, I make choice of yearling steers—one-year old on 1st March last—that have been well done to since birth, and that from the last five months' run upon permanent pasture come to stall weighing 1050 lb. per head on 1st Oct. Such animals of the proper beefing stamp are already well built in bone and muscle, and require eight months science and practice to finish for market—the object being to make them 1500 lb. for shipping on 1st June next, and secure at the same time 8 to 10 tons of the requisite manure.

The financial story now begins; the 1054 lbs. cost me \$47.25 at 4½c. per lb. or 1½c. more than it cost the producer. That it cost the producer this sum is easily ascertained by following the history of the calf up to the time we bought it. The first item of debit is certainly the service of the sire, which on an average cannot be put at less than \$2; the calf gets, or should get, half the mother's milk, which for five months—not less—is worth at least \$9.50; and to make the right kind of calf it should also receive extra food during milk, thus adding \$2.50 more to the cost. After weaning and until 12 months old, the animal is treated to regular diets of green fodder, or hay, with roots, bran, and grain: these calculated at cost of production will make \$7; then as a yearling, partly in the stall or shed in winter, and partly on pasture for the next seven months, up to 1st Oct. will equal at least \$12; so that food alone costs \$33, as it ought to be, as it must be, under the simplest matters of business. But there are other items: the bedding, attendance, and risks are, on an average, not less than \$4.50, so that we have

a sum of \$37.50 as the gross cost of a 19 months old store steer that weighs 1050 lbs. But gross cost is not net cost in the building up of these 1050 lbs. of flesh; towards which everything we can think of has been properly charged; all the materials were not made use of by the animal; the refuse called farm yard manure belongs to it, and certainly not to the farmer after the way the account has been made up. Valuing, for the kind and quantities of food consumed, upon both a scientific and practical basis, now fairly well established by experience and experiment, this refuse is worth \$7, thus reducing the net cost to \$29.90, or 3c. per lb. In addition to the manure profit the producer expects, and is fairly entitled to a real cash profit on the whole transaction, say twice the manure value, or 1½ cents per pound. Remember, that in changing the foods it was at actual cost, and not the value of them in the market, which would have been a profit. Altogether, then, we think the \$47.25, or 4½ cents per pound paid for the stall steer is reasonable for both parties.

By what now then am I to be guided in the finishing of this animal? What shall the food be? What shall the surroundings be—what the management, in all their important details? What do science and practice say?

Unquestionably, Ontario conditions call for housing of a very superior character, and this is always the first consideration in any mode of farming; but particularly the fattening of live stock. Much money is not implied, any more than other things. We desire to obtain warmth with thorough ventilation, and this ventilation must exist without currents. It is more dangerous to stand an animal in a draught than it is to subject it to extreme cold, and I feel assured that the cause of the somewhat prevalent animal consumption, or tuberculosis among cattle, and lung disease among sheep, is due largely to sudden variations of temperature in winter—brought about particularly by the over anxiety of many men in regard to the cowfoot, so called, of their animals—who believe in having the thermometer at 70° inside, when it stands at 10° outside. I think it is a clear mistake under any circumstances to shut the door on sheep—ewes just lambed excepted, and no science can convince me that an average temperature of 65°, is better than one of 45° in winter. A damp, cold temperature, causes animals to consume more food without corresponding results in growth, because very much of it is used as fuel to keep up warmth,—so not only ventilation, but drainage and proper light are necessary towards the best results. Whether the cattle beast should be tied or have a loose box, cannot for a moment be doubted, when economical handling of a large number is so important. Health in its fullest sense may not be always a part of stall management, but in the case of beef management, the kind of health implied by science of muscle is not a matter of much account. No doubt, the growing animal intended for beef, requires a little exercise daily to promote strength; but when ripening, the same animal only needs to be able to walk to market.

Thus far satisfactory with our fattening steer put up on 1st October, proper housing being simply so much food. But now as to the food itself. If I follow nature closely, I shall preserve nature's offerings in the shape of grasses, which, in variety, as is well known by properly managed permanent pasture, gives all that any cattle beast or sheep requires, both for fat-

tening or growth of youth. But good as our fodders are in any form, whether timothy and clover, meadow hay or corn fodder, they are found to be too slow for the present purpose—they would fatten just as well as anything else, but not fast enough. True! the best pastures of the world under the best of conditions, will give a greater daily increase than any other form of food, but we are in Ontario, and the time is winter.

I know, at the same time, that my fattening subjects are ruminating animals, and must have bulk of the rougher materials wherewith to chew the cud. The stomach must be filled with fodder, and not alone with sufficient nutritive value in small quantities, as can easily be done with other foods, such as grain. Here the theorist might easily commit a grave error, just as much as some chemists have done in assuming that certain concentrated fertilizers will grow certain crops, because they contain all the requisite foods for their complete maturing. The proper proportions and kinds of food are then points of great value in this study. We cannot set aside science in this work. Practically, foods give results according to their chemical analysis, when combined or mixed to suit the particular animal system. We have many examples of this one, thus: The great grain of the American continent called corn, is chemically higher than a mixture of peas and oats with that corn, yet the result in feeding is decidedly in favor of the mixture, as against the corn alone. Most foods are better in combination than alone, and the combination should be so arranged as to leave little or no waste. These are facts from the experience of many. The kinds and proportions of food to suit each individual animal exactly, so that it shall just receive the best nutritive ratio, are not so easily struck as may appear to some. If we take the corn, peas, oats, hay, turnips, mangolds, bran, with linseed cake or cottonseed cake, and look at them by their chemical standing, it becomes a nice mathematical lesson to hit the life or beat forming materia's that should accompany the flesh forming materials, so as to secure this nutritive ratio. All the foods named must be chemically balanced, and an agreement made with practice, for no amount of scientific knowledge can square-off any animal's meals without a copartnership with the practical feeder. Grain, in all instances, regulates the feeding value of a diet, so that one or two pounds more or less per day, has a greater effect than larger quantities of other forms of food. It is interesting to make the memorandum here, that experimental work with live stock all over the world differs materially in special lines of inquiry, such as feeding with one kind of crop, but when taken generally, such as feeding a large variety as we are now discussing, the results are remarkably uniform.

We are often asked, how do you prepare your cattle food? Do you cut or steam, or feed rough, that is, uncut fodder and roots?

With reference to these three forms of presenting food to cattle and sheep, I think there is little dispute about the following:—

First: That uncut hay or other fodder, and roots unbroken are most healthy, though less economical—leaving more refuse.

Second: That cut fodder and pulped roots mixed a-heap, and allowed to ferment slightly, so as to draw out sugary properties, are much more economical than any other form, and well adapted to both milking and beefing.