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handle stud rams will have experienced the difficulty with highly conditioned rams, reared under modern stud conditions, in regard to their general desire to mate. We have experienced that trouble and in the case of two or three rams on which we have tried this material the response to a small dose has been quite remarkable. Rams which would either not serve at all, or only reluctantly, or yield only a small sample of semen, after two or three doses of thyroprotein would take a normal interest and the yield was very much greater.

MR. HOLLARD: Regarding the use of thyroprotein in taking condition rapidly off a dairy cow in the hope of getting it in calf, we had occasion to use thyroprotein for this purpose only a few months ago, and we were successful in taking 100 lb. body weight off a cow within ten days or a fortnight. Regarding the second point: we had two aged dairy bulls who had lost much of their desire, and to these bulls was fed 30 grams of thyroprotein for a fortnight, and their libido remarkably increased, although there was no improvement in quality of semen.

DR. CAMPBELL: We are working in a bit of a trap in this matter. In one direction we are working towards the uses of this material and its practical application; on the other hand, we are worrying about the effect on things like herd test records. I do not see any way out of that dilemma. The second point I would make is that we must be prepared to advise those in authority concerning the effects of materials such as thyroprotein. There is little doubt that such are their properties that commercial use will be made of them unless we are very careful.

SUMMARY OF PAPER ON
THE VALUE OF SEPARATED MILK AND PASTURE AS A FOOD
FOR DAIRY CALVES

b y

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The growth rates and health of two groups of dairy calves (a) fed good pasture ad libitum plus skim-milk, (b) fed good pasture ad libitum plus skim-milk and $\frac{1}{2}$ lb. meal - the latter two equal on a S.E. basis to the skim-milk fed in (a) were compared during the period 6-22 weeks of age in the years 1940 and 1943. The basis of skim-milk feeding was 15% and 12% of body weight in the respective years, with limits of 2 gallons daily for Jersey and 2 $\frac{1}{2}$ gallons for Ayrshire and Friesian calves. The animals were given an initial period of 3-4 weeks on whole milk before being slowly changed over to skim-milk or skim-milk plus meal. Throughout the work the calves were grazed rotationally over the cow pastures.

No significant difference was observed in the body weight gained, the increase in height at withers, or in the general health of the calves. The results support the conclusions that: 1. Under the above grazing and feeding conditions and with good general management, calves will maintain a satisfactory growth rate on skim-milk unsupplemented by meal; 2. Apart from any advantage associated with a saving of skim-milk, there is no benefit from introducing meal into the ration at the expense of skim-milk; 3. 4 lb. of skim-milk may be replaced by $\frac{1}{2}$ lb. of a good grain meal mixture in the diet of calves without affecting the growth rate of the animals.

The growth rates and health of two groups of Jersey dairy calves (a) fed good pasture ad libitum plus skim-milk on the basis of 10% live weight up to a maximum of 2 gallons per day, (b) fed good pasture ad libitum plus skim-milk on the basis of 15% live weight, up to a maximum of 3 gallons per day, were compared during the period 7-24 weeks of age in the year 1945. The animals were fed whole milk for 4 weeks on the basis of 12% of body weight with a minimum of 1 gallon daily, and then changed

over gradually to skim-milk. The animals were rotationally grazed over the cow pastures.

There was no significant difference in the live weight gained, the increase in height at withers, the increase in heart girths, or in the general health of the calves. The results show that under good management conditions a very satisfactory basis for feeding skim-milk is 10% live weight up to a maximum of 2 gallons daily. The average female Jersey calf reared under good management should weigh 100 lbs. at 7-8 weeks, and 200 lbs. at 15-16 weeks. On a feeding schedule based on 10% of body weight, an average sized Jersey calf should make satisfactory growth under good management conditions if fed 1 gallon until 7 weeks of age increasing to a maximum of 2 gallons at 16 weeks, and then fed at this level until weaning.

From these two different experiments it is concluded that separated milk and pasture form a very satisfactory diet for dairy calves following an initial period of 3-4 weeks whole milk feeding, and provided that the pasture is well controlled and leafy.

DISCUSSION ON MISS COOK'S PAPER:

DR. FILMER: I was brought up under the old system of feeding stock, where pastures are not adequate. I learned about the feeding of meals both to mature and immature flocks, and it took me some time to realise just how good N.Z. pasture was. There are others in the same class as me, and I hope they will ask questions if they are not as completely satisfied as I am.

MR. KNOWLES: Is this work being carried on, or is it completed at this stage?

MISS COOK: The experiments are completed when the calves reach six months of age. And from that stage they are under the control of the College Farm Manager.

MR. ROACH: Would you say that the pastures were average, good average, or particularly good? The grasses at Massey, I believe, are not bad, and that is not always the case on other farms. I do not suggest that the work falls down because some farms have not as good pasture, but would you say that your work is unbiassed by good pasture?

MISS COOK: There was not one paddock that was not used; they are the only pastures available for the work, and as you know the pastures, you know the conditions under which the calves were raised.

THE PRESIDENT: Have you adopted what is quite a recent practice - running the calves ahead of the cows, or does that come afterwards?

MISS COOK: That is a matter over which I have had a good deal of trouble with the man in charge. I have attempted to run the calves ahead of the cows, and in most cases I have not been behind the cows.

THE PRESIDENT: As these figures show a different position from what we expected to see, we should take notice of the fact that if those calves did graze ahead of the dairy cows, it is a system that very few farmers have yet adopted and those figures will be valuable to them.

DR. McMEEKAN: At Ruakura we have done a good deal of calf work over the past years. It has been largely a study of

comparing grazing and management techniques after weaning, so that the calves have been reared under similar conditions prior to that time. During the last two years, however, we have introduced grazing management differences shortly after birth. We have one class reared under conditions comparable to those mentioned by the speaker, and another class reared in a relatively closer grazed calf paddock, typical of the average cockey's farm and differences in growth during the early stage do not appear to be related to any need for meal feeding of any kind. That reinforces Dr. Filmer's point that New Zealand has done one thing to upset the orthodox nutritionalist, and blown out the idea that permeates the nutritional text books of a balance of protein, carbohydrates, and so on. Parallel to this calf work is the pig work, which has shown almost unbelievably high ^{growth} rate figures on skimmed milk with meal. The New Zealand setup seems to indicate very strongly that the important factor is the amount of feed given, assuming that it has sufficient protein. What has been forgotten in the overseas work is the fact that that work has been done in an environment where economic conditions have focussed attention on something that does not concern us, because protein feed here is cheap, in grass, etc.

DR. CAMPBELL: I might add that these calves were run on pastures which varied in composition. It was not predominantly rye grass and white clover. Regarding the point whether the calves were in front or behind the cows; our main cow work last season consisted of comparing half fed animals with fully fed animals during the winter, and one practical result was that half the fences in our experimental area were pushed down, so we had to arrange grazing so that the calves were as far as possible from the cows. I think Miss Cook may be overstating the case in saying that the calves were in front of the cows, because for a large part of the time the calves were half in front and half behind.

MR. HANCOCK: We hear a lot now about how good pasture is for the young calves. At what age does a calf begin to eat grass?

MISS COOK: I have observed calves picking a leaf of grass at three or four days. By the time they are a month old, they must be eating a considerable amount.

DR. HAMILTON: Dr. McMeekan mentioned he was grazing his calves on what he fondly imagined were dairy farm conditions, but I do not think he has anything as tough as a lot of farms some of our consulting officers could take him on to. One wonders whether these results would be duplicated on farms, which I think are still fairly numerous, where the calves are kept virtually up to weaning time on very bare pasture, heavily overstocked. I have no doubt at all that the story is perfectly correct where the calves have access to ample feed supplies. We have no data as to what proportion of farms in the country that is a picture of, but I have no doubt that a large number the calves cannot get adequate fresh pasture to supplement skimmed milk.

DR. CUNNINGHAM: One point puzzles me. I understood that meal replaced some of the skimmed milk.

MISS COOK: That is correct.

DR. CUNNINGHAM: That touches on the same point that Dr. Hamilton is stressing. Obviously the advice would be to rotate the calves in front of the cows, to give them good grazing. But in the cases where there is no good grass, will meal assist skimmed milk feeding? I do not think the dairy farmer would

be interested in saving skimmed milk in calf-breeding, but with whether the addition of meal to the normal ration of skimmed milk would add to the growth of his calf. So I am puzzled to know whether the experiment was designed to save skimmed milk instead of feeding meal in addition to the skimmed milk.

MISS COOK: The experiment was carried out to see if it was necessary to replace skimmed milk with a greater variety of nutrients. An experiment, feeding them all the same amount of skimmed milk and adding meal, is to be taken up later.

DR. CAMPBELL: We took the ordinary farmer to look at these calves, and he thought they were grand calves. Pedigree farmers thought they were overgrown, too heavy in the bone. The present results really cover the whole situation, but only of course where they have good grass.

DR. FILMER: Conditions at Ruakura this year have been as hard as one would hope any average dairy farmer would have to face in New Zealand, and we have succeeded in rearing quite good calves. A large number of badly reared calves in N.Z. are on farms where there is plenty of grass. It is not shortage of grass at all. It is sheer bad management; farmers will insist on putting their calves in one paddock and leaving them there too long. They have any amount of feed they could give to the calves, but they find it a little hard to open the gates often enough. The majority of farmers could rear quite good calves, without giving any supplements, and without reducing the mature stock on their farms.

MR. NIELSON: Dr. Hamilton is right in saying that even the poor conditions at Ruakura this year are not nearly as hard as the majority of farmers have for breeding their calves. But surely the solution is there in getting their calves out, and even running them with their cows. We have a lot to thank Miss Cook and Massey College for in regard to the very practical importance of this calf work. There are lots of snags in getting the farmers to practice it, particularly the pedigree breeders who want to reduce the calf to a skeleton.

DR. McMEKAN: I agree with Dr. Filmer. Dr. Hamilton has not been to Ruakura for a long time. One reason why our farmer group calves are not quite as tough as they are likely to be under some conditions is capable of logical explanation. Dr. Hamilton, two years ago, insisted that this work was useless unless it was carried on to the production stage. I want to have those calves with me in two years' time. If we were running them any tougher than we are at the moment, they would not be with us very long.
