

New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](#).



You are free to:

Share— copy and redistribute the material in any medium or format

Under the following terms:

Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for [commercial purposes](#).

NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

of view. If these figures can be accepted and the principle therein accepted, I would suggest, without prejudice, that therein lies a still further reason for active efforts to be instituted towards combining the various methods of testing cattle into one organisation. The really important and mechanical differences between the system operated by the State and a separate system operated by the farmer today lies, on the one hand, in the fact that the State system involves daily milks, plus a three-milking check system, as opposed to the farmer's system which does not include daily milk records and does not include that check. One difference I suggest appears to be eliminated. From the experimental point of view, Dr. Campbell has produced some interesting data. On the question of the relative frequency of sampling necessary, I was not quite clear from his remarks whether his comparisons of weekly, twice weekly, fortnightly, and monthly figures, were based on comparisons of test variations with those time intervals and daily milks, or whether upon the test of milk taken at those intervals. In other words, from an experimental point of view, do I still have to weigh milk daily to cut the standard deviation down to the limits shown, or can I cut the test down to a weekly basis and still preserve a high degree of accuracy?

DR. CAMPBELL: Using the accuracy shown for twice-weekly sampling as an example: milk weight and fat tests were determined on Monday and Tuesday only of the week. Similarly weekly testing was on Tuesday only, so that the milk weight and milk tests were taken only at the intervals shown.

SUMMARY OF PAPER ON "THE STIMULATION OF MILK SECRETION IN DAIRY CATTLE WITH DIETHYLSTILBESTROL AND THYROPROTEIN"

by
M. G. HOLLARD and I. L. CAMPBELL, DAIRY RESEARCH INSTITUTE,
PALMERSTON NORTH.

At the 1944 conference of this Society a paper was given summarising the early results of a study being carried out at the Dairy Research Institute on the artificial stimulation of milk production in dry, non-pregnant dairy cattle with diethylstilbestrol. The main objects of this study were to determine whether dry, empty cows could be brought into milk production by injecting diethylstilbestrol, and to see whether the feeding of thyroprotein would augment the milk production thus stimulated. These trials have now been completed and the present paper summarises the results.

The animals used comprised both empty, dry, and empty stripper cows - all of which were suffering from the temporary or permanent sterility, and, in addition, three sterile heifers. The seventeen animals included thirteen mature Jersey cows, two sterile Jersey heifers, one mature Friesian cow, and one sterile Friesian heifer. The dosages of diethylstilbestrol used varied from 163 mg. given over 66 days to 455 mg. over 91 days. In most cases, the amount of diethylstilbestrol injected was increased in a regular manner from the beginning to the end of the injection period. Milking was commenced toward the end, or at the end, of the injection period.

The results showed a very wide variation in the response in yield of milk and fat varying from negligible to remarkably high productions. Eleven cows gave fat yields from 0-100 lb., three from 100-200 lb., one 214 lb., one 304 lb., and one 445 lb. The average fat yield, including those animals which gave a negligible response, was 98 lb. This variation seemed unrelated to the dosage employed or to the length of the injection period. Sterile heifers responded in the same manner as older cows. Where cows had had previous natural lactations, the natural production fig-

ures were in all cases higher than those resulting from the artificially induced milking periods. In most cases, the butterfat test was slightly higher in the normal lactations.

The fat and solids-not-fat contents of the milk of animals which had been stimulated to substantial production were within the normal range, although in most cases for which a comparison could be made, both the fat and solids-not-fat contents were slightly below the average figures for previous lactations.

Certain undesirable features were associated with the treatment. During the injection period many of the animals were in frequent estrus. The animals showed, in varying degrees, anatomical changes in the pelvic region, in particular, elevation of the tailhead and relaxation of the pelvic ligaments. These changes, together with the coital mimicry associated with frequent estrus, resulted in the fracture of pelvic bones in three cows. Of fourteen cows mated following the injections, five (36%) became pregnant.

Iodinated casein was prepared according to the method of Reineke & Turner (1942) with minor modifications, using a 200 gallon cheese vat and dairy factory equipment. Eight animals in which lactation had been established after treatment with diethylstilbestrol, and which were in the declining phase of production were fed thyroprotein.

The trials were designed as follows:- 15 gm. thyroprotein per day were given to each of four cows over 14 days; 25 gm. per day over 21 days to each of four cows; and a dose increasing from 25 to 30 to 35 gm. per day in weekly increments over 21 days to each of five cows. At each dose level, significant increases in milk yield, fat content, and fat yield were obtained. No consistent effect on the S.N.F. content of the milk was observed. The animals all showed a marked increase in pulse rate during the feeding period. At the same time, where the dose was 25 gm. per cow per day or more, there was a steady decline in body weight.

Following cessation of the treatment, there was a marked decline in milk and fat production and in heart rate, while body weight was slowly regained.

These experiments showed that the milk and fat production of cows in which lactation had been induced with diethylstilbestrol could be significantly increased by feeding thyroprotein. As the results with these cows were similar to those obtained with normal animals, the present data also serve as an excellent illustration of the effect of thyroprotein on the lactating dairy cow.

REFERENCE:

Reineke, E.P. & Turner, C.W. (1942) Mo. Agr. Exp. Sta. Res. Bul. 355.

DISCUSSION ON MR. HOLLARD'S AND DR. CAMPBELL'S PAPER:

MR. RANSTEAD: Did the sudden drop in milk yield at the end of thyroprotein feeding have anything to do with the cows being at the end of their lactation period?

MR. HOLLARD: The drop which we obtained in all cases in the milk yield, occurred within a period of a week, and the milk yield dropped down to a level remarkably below that which existed at the time of the feeding period, but in nearly all cases the yield recovered to a level which was nearly equal to that of the pre-feeding period.

DR. COOP: I had an opportunity before I left England, of discussing these problems with Dr. Hammond, Dr. Folley and Dr. Blaxter. With regard to stilbestrol, I notice that you did not

use any tablet implantations, which is the method favoured in England. Was that because you could not get the tablets? They found, as you did, that the response from stilbestrol was extremely variable. They obtained from barren cows and heifers, an average yield of 400 gallons of milk per lactation. I do not know how that compares with yours. It raises the whole question of what is the practical significance of this? With this in view, the Ministry of Agriculture in England got Folley and Hammond together and managed to get them to agree to a joint experiment, and the results I have quoted were from these joint experiments. The undesirable effects which they obtained - the uneven response, and so on - practically prevented anything of practical importance coming out of this work. It was far too variable to be of use to the farmer. There is a further point, that the demands in England are different from what they are here. What they wanted in England was that, with the end of the war in Europe, they knew that the cattle populations of Europe would be very low, and they hoped to be able to increase the milk supply of barren cows and heifers. Unfortunately, it looked rather unpromising, and nothing further has come of it. With regard to iodinated casein, here again the position is different in England. There they were looking for something that would raise the milk production over a small period. As you know, the dairying industry in Britain has gone almost completely on to milk production, and in the winter months they are pretty short of milk. So they thought that if they could stimulate milk secretion in winter or early spring, it would be some achievement. That was what was behind the iodinated casein work. A young man named Blaxter carried out a very large experiment over the whole of England with about 1,000 cows. There again his treatment was different from yours in that he fed the iodinated casein in the form of cakes - very much simpler to do than your drench. Each farmer was given cakes of 2 lb. a day, and that contained a reasonable dosage of iodinated casein. They found that the feeding of iodinated casein did not affect the peak of lactation; what it did was to maintain the peak of lactation. I think they got something like a 20 or 30 per cent. increase in yield thereby. Unfortunately, I do not think they carried on the experiment long enough to find out what was the effect of the experiment on the remainder of lactation, and I think you would find that the subsequent lactation would be lower than the normal lactation curve. In other words, what you had gained would be lost in the low lactation period. Another criticism of this work is that, so far as I know, it has only been done over one lactation. We do not know what the effect of it is on a cow, but we know it is pretty severe. We need to know what is to be gained by this if you are going to decrease the life of the cow to any extent. You will also have to increase the feed supply to the cow during the winter to make up the loss of weight that has been incurred through the use of iodinated casein. So there is still a great deal of work to be done on iodinated casein, and nothing further seems to be happening in England. I think the people who have done the work are quite keen on it, but the more orthodox nutritionists are more sceptical about it. So things are more or less stagnant over there. We have to start thinking now, what is the next step, and we will have to wait for the chemists to produce some synthetic hormones other than those they have already produced, because, on the results to date, it does not look as though we can apply them immediately. I would ask, what does Mr. Hollard think would be the practical application of all this in New Zealand? I find it difficult to see that it would have much application.

MR. HOLLARD: So far as the usefulness of the stilbestrol work is concerned, obviously stilbestrol itself has some very serious disadvantages from a management point of view, which I have already indicated, and obviously stilbestrol cannot be used on a farm scale at the present time. As you say, we will have to wait until we have available substances such as proges-

terone, which will tone down the stilbestrol, and assist in giving us an induced lactation without the undesirable features. So far as thyroprotein in New Zealand is concerned, it could possibly be of use to those herds where winter milking is being practiced. We had visualised the possibility of carrying out an experiment in which autumn calving cows would be fed thyroprotein in the winter period, when any decrease in weight would be partially offset later by an increase in weight caused by the spring grass. That is one avenue to be explored.

DR. CAMPBELL: One of the reasons for using injections of stilbestrol as against tablets, is that tablet work was in its infancy at that time, and the technique was still being developed experimentally in England. Furthermore, it was our opinion at that time that the dosage that should be given to cattle should be increased during the period of dosage, simulating the process during pregnancy. It was difficult to do that by using tablets. The comparison of the yields of milk between the English results and our own, are not very significant on a gallonage basis, because differences of butterfat would enter into that, and our cows were predominantly Jersey. However, on the published results from America and England, our results have been very similar to those of overseas workers. As to the worth of the work, there is one point that has not been touched on; in all fundamental work such as this - using rats, guinea pigs, and so on - there comes a time when we must check up on the practical application of that work, and at least attempt to test out the worth of that work in domestic animals such as the cow. It was felt that this was a good time to make that check. I do not think the effort has been wasted, even although it does not follow at the moment that we can place the method in the hands of the farmer. There is a difference between our work and the English work in thyroprotein. England was even more under pressure than we were to increase production at that time, so that work had to be carried out on a large scale, whereas our own was on a rather small scale. As ours was on a small scale, it was felt that it was best to do it as accurately as possible, and the method of using drench ensured that the cow got the lot. We found in trials with meal, for example, that on occasions, we could not guarantee that the cows got the dose that we set in front of them, and the same, I am sure, would apply to cake feeding. In using a drench, we did ensure that the cow actually got within its system the exact amount that was weighed into the bottle. Dr. Coop has pointed out that the English people confirmed the American work - that the thyroprotein did not increase the peak of production, but was better used in the later phases of lactation. There is another point I would add to that: the American workers found that where cows were turned out on to grass, they often got a rise in production, and under those circumstances they did not give any great further increase with thyroprotein. This is a point which might apply to New Zealand, in that it might be felt that one of the times thyroprotein might be used would be when all the feed was available that the cow required, i.e., in the late spring, or early summer, when, under our circumstances, the cows are usually at their peak of lactation and also on the best possible grass. From the above results we might expect the least response under those conditions. While I agree with Dr. Coop on long term studies being necessary, and that we must be careful in watching that we do not harm the animal in any way by shortening her life too much, or interfering with its metabolic processes, I might take him up on one point, that the shortening of life, or the shortening of a lactation record, may not be an important factor. What is important is the production. There are two sides to production - that of total production, and that taking time into consideration. If we can produce 300 lb. of fat in six months, why take nine months to produce it - provided that we do no damage to the cow? If we can produce 10,000 lb. of butterfat in four lactations, why take seven about it, providing we do not damage the cow? That, of course, is a very small point, but it is one which should not be overlooked.

DR. COOP: I simply wanted to know what New Zealand hoped to gain from this work. It seems fashionable at this conference to have a "go" at the breeders. I would venture to say that if iodinated casein got into their hands something might possibly go wrong with the herd recording. Regarding the other point: if you are going to get so much more butterfat in six months, you still have not solved the problem that during the remaining six months, you have to give your cow far more food. In other words, you do not gain anything. What you do gain is that you get more milk for a short period when you want it.

DR. HAMILTON: Dr. Coop suggested you do not gain anything if you get your milk in six months. I think you gain a lot, because you do not get up so early in the morning. Regarding the other point, we would obviously be placed in a difficult situation if the breeder could use these materials without the testing officer being able to be aware of it. Apart from taking the pulse rate, which would scarcely be possible, is there any ready method of detecting the feeding of substances like thyroprotein?

DR. CAMPBELL: That has given us some reason for thought also. It seems to me that it could be used to give false results by someone who knew the characteristics of thyroprotein very thoroughly, and who had foreknowledge of the times of the tester's visit.

MR. SWAN: Is there any possibility of the milk from animals being fed on synthetic hormones, having an undesirable effect on the persons consuming it?

MR. HOLLARD: Dr. Turner, of Missouri, and his daughter, consumed milk for some period from animals that had been fed on thyroprotein. Iodinated casein does not pass into the milk and affect consumers.

MR. ROACH: I was associated with some of the earliest work in connection with tablet implantation. You are up against two opposing factors there. If you use one tablet, it is difficult to get a uniform absorption. It was far better to use multiple small tablets. Another snag arose from that. It was found that the milk yield steadily rose to a maximum, after which any further stilbestrol reversed the action, and then you had to take your tablets out, and if they were a number of small tablets, that was difficult. We have been shown that thyroprotein will increase the milk yield. Is the reverse the case, that if an animal is deficient in thyroid substance it suffers from a chronic lowness in milk yield? That is an important point.

DR. CAMPBELL: All we can say is that no survey has been carried out on thyroid activity in our cattle. At the moment, we are attempting to make this survey in a very small way by checking thyroid size in dairy cattle, and hoping to get a line on the work from that angle. However, if the case of one cow may be quoted as evidence, I do not think there is any doubt that if we depress thyroid activity to a sufficient extent we will get a decline in milk yield. That has been shown by thyroidectomy experiments. We have one unfortunate animal at the Institute - the survivor of some culls sent to us from Rua-kura - to which Mr. Hollard has been feeding thiourea for three weeks. That drug has the effect of depressing thyroid activity in that it blocks the formation of the thyroid hormone. One of the first results was a lowering in the milk yield. We were following the milk composition in the hope that we would see the opposite effect to thyroprotein - we somewhat expected to see a drop in the fat content of the milk, which we did not find; and we were also observing the effect on solids-not-fat. We did find a drop in the lactose content.

MR. RANSTEAD: I have references to work done which goes to show that the thyroids in beef Shorthorns are not as large or as

active as those in the milking Shorthorns. I suggest that the difference is not due to multiple factors, as some people think, but may be due to a single factor which governs the thyroid. I would like to see an experiment carried out, where, by giving thyroprotein to milking Shorthorns the milk production could be stimulated.

DR. COOP: The field is sufficiently open to be very promising.

MR. HANCOCK: Would it be possible to detect thyroprotein feeding by the increased amount of iodine in the milk? And did you try to calculate the net loss of energy caused to the cow by increased metabolism, and could you account for the whole loss of weight by the losses in these two components? I would also point out that the milk of cows that have been fed thyroprotein has been found to be toxic to invalids, at least.

DR. CAMPBELL: We have no data on the iodine content of the milk. I do not know how that would be affected. There is no free iodine in the thyroprotein. However, it is a point on which we might do some work, but I think it would have very little practical significance in spot tests. You might visualise samples being sent from C.O.R. cows, and having quite a good deal of money spent on them but it could not be done under herd conditions. Regarding the effect of thyroprotein going through into the milk and affecting persons. Dr. Turner and his daughter drank one or two quarts per day and there was no difference in their basic metabolism, over the two periods in which the quantities were taken. It was also checked on guinea pigs, which are very quickly affected by thyroprotein and show an immediate rise in metabolism if affected. They showed no change in basal metabolism. Regarding the loss of energy, we could not get any check on that without control of feeding, and we have not had that. The cows have grazed on the pasture.

MR. HANCOCK: Was there any sign of lack of appetite?

DR. CAMPBELL: That only comes in when the cow has been over-dosed with thyroprotein. If farmers gave an overdose, there would be a decrease in production and a decrease in the appetite.

DR. FILMER: Was the increase in respiration sufficient to be detectable? Is there any possibility of thyroprotein being used to increase lactation in aborting cows? That seems to me to be a practical use, as it would only need to be used over one lactation, and figures show that production of fat after abortion is about 100 lb. below the normal lactation.

MR. HOLLARD: The respiration rate was not noticeably increased as far as I could see. I do not know of any data which would throw light on the second point.

MR. MATSON: Were these cattle pregnant at the time of the trial?

MR. HOLLARD: Of the 14 cows mated, five became pregnant and these would be in the very initial stages of pregnancy when the feeding was being carried out.

DR. McMEEKAN: Some query has been raised as to the practical use of some of these materials. I would mention that there appears to be some possibility in the use of thyroprotein as a means of whipping condition off an animal very quickly. Under some circumstances, that is desirable, or appears to be. In other words, I think Mr. Ranstead is rather fond of a theory that he was able to deal with a cow in calf that was terribly fat by feeding this material. We have had a "little go" at that with an animal at Ruakura, and it seems to work. My main point is in connection with rams. Anyone of us who has had to