A SUMMARY OF INTAKE STUDIES WITH HOGGETS

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THE OBSERVATION has been recorded (Clarke and Filmer, 1956) that in ill-thriftiness of hoggets a marked depression of feed intake is a characteristic symptom. However, depression of appetite is a common accompaniment of illness of any kind, and more commonly a result rather than a cause of disease.

However, field trials have clearly demonstrated that ill-thrift did not occur when lambs born out of season were weaned at the normal weaning age in the spring, although these lambs and lambs born in the spring and weaned early in January both showed depression of appetite and loss of liveweight in the autumn. Although the paddocks used were the same in the spring and in the autumn, and the animals and their management as similar as possible, there were necessarily many seasonal differences apart from pasture differences. It is stressed that parasites were practically eliminated in both seasons.

It was decided therefore to follow up these field observations with pen feeding trials using grass, at the same stage of growth, from the same paddocks cut and dried in the spring and in the autumn and fed to similar animals in a common environment.

Figure 1 shows the liveweight changes of hoggets of a similar age over the periods, August-November and February-June. The hoggets on the spring grass and the short autumn grass were run on the same paddocks at the same rate of stocking and in both cases the length of pasture was controlled to a height of 3 to 4 in. by the use of cattle and if necessary by topping with a mower. Grass was cut from these paddocks at the periods shown in the figure and immediately dried in a hot air dryer at about 105°C.

The "long" autumn pasture was uncontrolled and became long and stemmy but leafy with a good clover complement. The dairy farm pasture was long and leafy at all times.

On the spring pasture and on dairy farm pasture the liveweight changes were similar and averaged about 0.38 lb increase daily over the period of the trial. The long uncontrolled pasture maintained a good liveweight increase until mid-April, by which time the pasture consisted only of seed stalk and fresh, patchy

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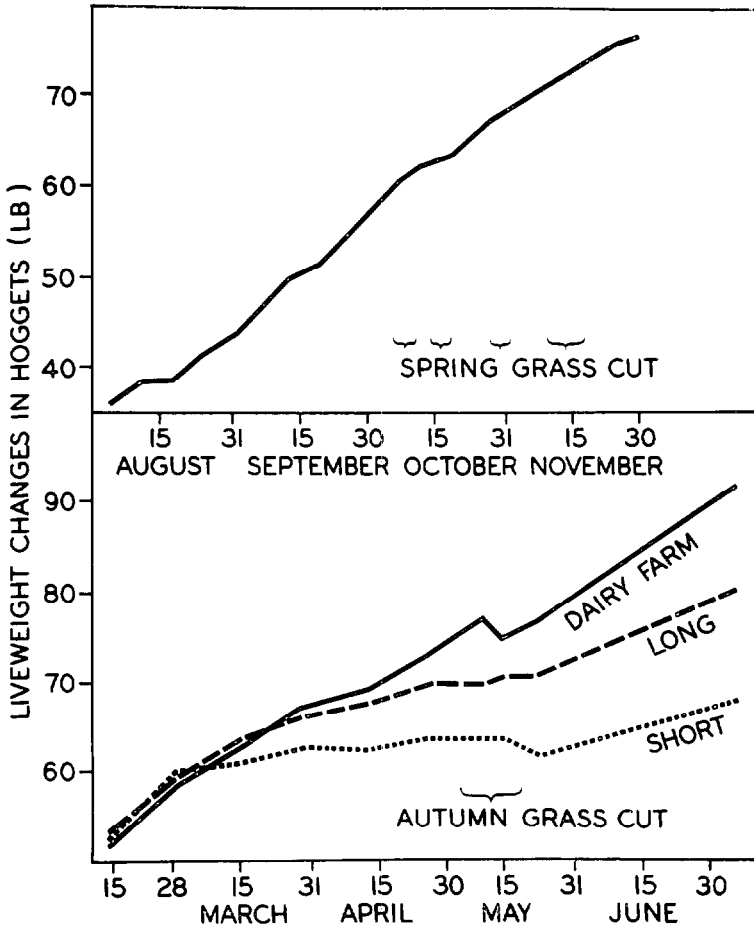

Fig. 1: Liveweight changes in hoggets on spring and on autumn pasture.

growth on which the sheep concentrated their grazing and on which poor gains were made. Selective grazing by the hoggets was similarly clearly observed on dairy farm pastures but these remained long and leafy under dairy cow management. Because of this marked selective grazing it was not possible to harvest and dry the herbage eaten by the sheep on either the dairy farm pasture or on the long uncontrolled sheep pasture. On the controlled sheep pastures both in the spring and in the autumn selective grazing did not occur to any noticeable extent, and in fact was

relatively impossible under a system of complete utilization. On these pastures the herbage was cut with a lawnmower to about 1 in. above ground level. Complete drying of the grass within a few hours of cutting was aimed at.

In harvesting grass for drying, it is important, where maximum palatability is to be preserved, to avoid collecting soil, dead material, dung, etc., with the herbage. To achieve this a suitable area must be prepared for cutting by a preliminary mowing and removal of the mowings and thereafter stock must be excluded. Such prerequisites have precluded the possibility of harvesting grass from farms where ill-thrift has manifested itself.

Intake of Spring and Autumn Dried Grass

Wether hoggets used in these trials were first conditioned to living in pens over a period of 3 to 4 weeks. Those few failing to adapt themselves were eliminated. Over a further period of 2 to 3 weeks the hoggets were individually fed dried spring grass *ad lib.*, and their intakes on a dry matter (D.M.) basis determined daily, by weighing and measuring D.M. content of both feed and unconsumed residues.

For the intake trials hoggets were randomized into groups of five each, but restricted on the basis of appetite and liveweight.

The digestibility of the feed was determined in the usual manner using harness and bags and intake calculated for each hogget on a digestible dry matter (D.D.M.) basis.

Figure 2 shows the mean intake of D.D.M. of three groups of hoggets, namely, one group on spring grass, one on autumn grass and one on spring grass but with intake restricted on a D.D.M. basis to that of autumn grass.

The hoggets on autumn grass were kept on this feed throughout the trial and mean intake seldom exceeded 450 g daily. Those on spring grass had a mean intake of over 600 g or approximately 40 per cent. greater than those on autumn grass. Differences in intake of similar magnitude have been found in the field between thrifty hoggets on dairy farm pastures and hoggets failing to grow on autumn sheep pastures.

The hoggets on spring dried grass were changed to autumn grass on 19 June and this was followed by a steady fall in intake over the next 8 days to a level of intake characteristic of the hoggets in the autumn grass group. Changed to dried white clover (in lieu of spring grass which was in short supply) this group of hoggets showed a most spectacular recovery in appetite. Another

change to autumn grass resulted again in a marked drop in appetite and the same spectacular recovery of intake followed the change to clover.

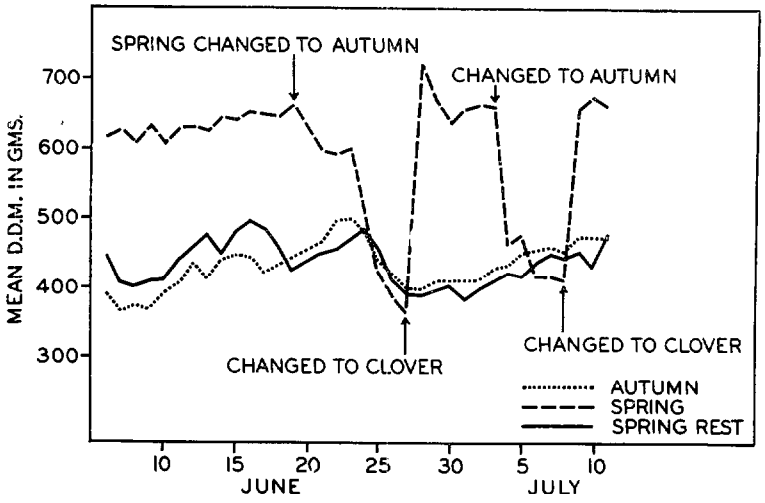

Fig. 2: Intake of spring and autumn dried grass.

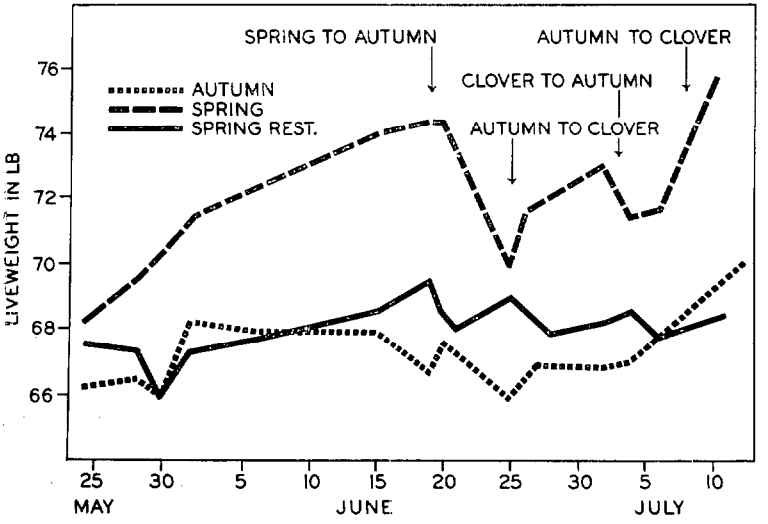

Fig. 3: Liveweight changes of hoggets on dried grass.

The liveweight changes in these three groups are shown in Fig. 3. The spring grass group showed a steady liveweight increase of about 0.3 lb daily, only slightly below that of similar hoggets in the field (Fig. 1). The wide fluctuations in liveweight shown by this group from 20 June onwards are associated with variations in stomach contents consequent upon the feed changes shown in Fig. 2.

In the case of the autumn feed and restricted spring feed groups the level of intake has clearly provided only a bare maintenance ration, and again parallels the results in the field on controlled autumn pasture. Throughout the trial no symptoms of ill health in these hoggets could be detected. The haemoglobin level in the blood was within the normal range and cell counts were normal. At the conclusion of the trial all hoggets were killed but a searching post mortem examination by the Ruakura Diagnostic Section failed to reveal any trace of abnormality. Those on the autumn feed group and the restricted spring feed group were leaner animals but with no signs of ill health.

The similarity of the two feeds in terms of orthodox feed analysis and digestibility of D.M. is shown in Table 1. The major difference is in the nitrogen content which is appreciably higher in the autumn feed.

Analyses made by Dr G. W. Butler (Plant Chemistry Division, D.S.I.R., Palmerston North) of the nitrate levels in the two feeds used in these trials have shown that in the spring feed the nitrate content, expressed as KNO_3 equivalent on a D.M. basis, was only 0.14 per cent. whereas in the autumn feed it showed a sevenfold increase to 0.96 per cent.

In two other seasons, dried grass from these same pastures has given similar low values for nitrate in the spring, but also low values (0.35 per cent. and 0.18 per cent.) in the autumn. In both these seasons hoggets continually grazed on these pastures from January to June failed to show any cessation of liveweight increase. Furthermore, some samples of grass harvested and dried

TABLE 1: COMPOSITION OF SPRING AND AUTUMN DRIED GRASS

	On D.M. Basis					
	D.M.	*D.D.M.*	*Ash*	*Nitrogen*	*Extract*	*Fibre*
	%	%	%	%	%	%
Spring	85.2	74.9	10.7	3.76	2.77	25.8
Autumn	87.2	71.5	10.8	4.49	2.29	22.2

from the pastures were consumed at high and productive levels when fed to hoggets in pens.

The significance of high nitrate levels occurring on some autumn pastures is not known; also their contribution to the higher nitrogen level of the autumn feed shown in Table 1 is obviously very small.

In the detection of "low intake" autumn grass for future pen feeding studies the nitrate level may, however, prove a more wieldy tool than the liveweight gains of hoggets grazed on the pasture.

The chemical nature of the nitrate in the grass is not known and it may well be a very complex entity.

Potassium nitrate added to spring grass at 1, 2 and 3 per cent. levels on a D.M. basis failed to lower intake. This is illustrated in Fig. 4 which shows the mean daily intakes, on a

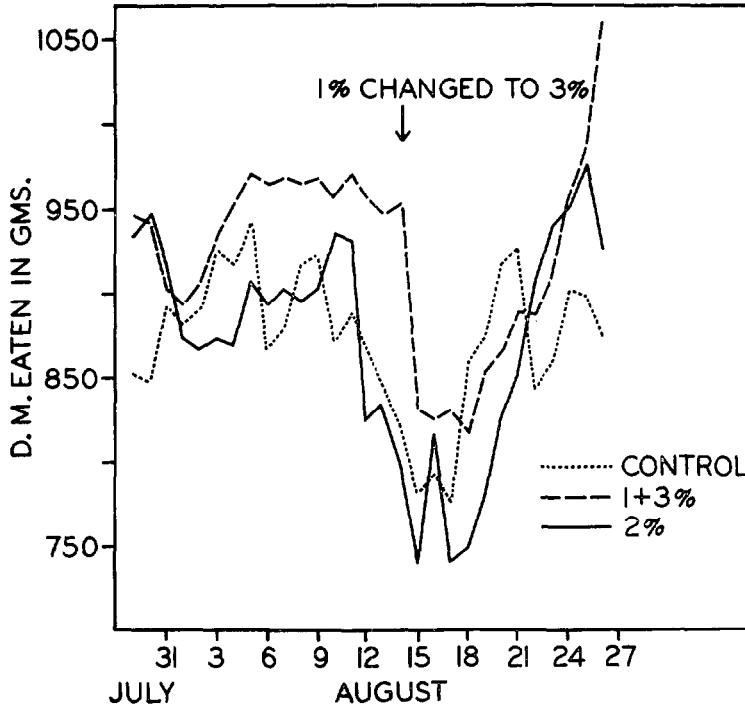

Fig. 4: Intake of grass and potassium nitrate.

D.M. basis, of three groups of five hoggets each. The fall in intake in all three groups in mid-August is attributed to sudden cold and wintry weather conditions. There is no suggestion of any significant effect from added nitrate, and it is interesting to record that methaemoglobin could not be detected in the blood at the conclusion of the trial.

These feeding trials with dried grass are reported, not only because they do substantiate similar findings with hoggets and indeed with mature sheep in the field, but also because they exemplify a growing and now widely held belief that traditional measures of pasture quality are grossly inadequate.

It is not pretended that such preliminary trials here reported either define a problem, or denote its magnitude and true significance. It is believed, however, that a problem is indicated which warrants confirmation and systematic attack on a broad front.

Literature Cited

CLARKE, E. A., FILMER, D. B. (1956): *N.Z. J. Agric., 92:* 115.

DISCUSSION

Q.: *Is the growth rate of hoggets fed autumn grass equal to their rate of growth when fed spring grass at the same level of intake?*

A.: Yes. We can find no effect on the animal from the autumn grass, but intake is consistently at a maintenance or submaintenance level.

DR H. MCL. GORDON: Work has been carried out on the effect of different nematode parasites, particularly *Trichostrongylus* spp. on the weights of hoggets. Following a large artificially given dose of *Trichostrongylus* larvae it was found that the weights of the hoggets dropped. This species is regarded as a primary parasite in Australia and possibly could be a cause or a contributing factor in the production of hogget ill-thrift.

DR J. F. FILMER: The subject of appetite in animals is an extremely interesting one but there is one thing that can be said about hogget ill-thrift and that is it is not starvation.

DR A. T. JOHNS: There appear to be a number of ways in which a ruminant's appetite can be affected.

(a) The animal may smell the pasture and avoid such areas as dung and urine patches.

(b) It may bite the herbage and not like it.

(c) It may swallow the herbage and changes may be brought about by the microbial fermentation which put the animal off its feed.

(d) The animal's appetite may only be affected when the food has moved on past the stomachs.

In our work on the use of mineral oils for bloat control, it was found that dosing by mouth with light paraffin oils gave in some animals a maximum depression of appetite 24 to 36 h after dosing. The introduction of paraffin directly into the omasum caused the depression of intake to occur much sooner (approximately 6 h) and the effect was much more severe. The most likely explanation of this effect is irritation of the lower gut.

If the effect on appetite in the hogget ill-thrift problem is a delayed one, then it may be a more complicated problem than previously thought.

DR W. H. PFANDER: Changes in the activity of the rumen microorganisms can affect the animal's appetite. For instance, we found that when nitrate had been consumed the entire rumen was practically sterilized and the animal was unable to digest its food.