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# PRELIMINARY TRIALS WITH WHEY FOR FATTENING PIGS

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TRADITIONALLY, THE EMPHASIS in New Zealand pig production has been on the elimination, rather than the efficient utilization, of embarrassing by-products of the dairy industry. This is particularly true of whey—the least valuable of these materials. At present, considerable quantities of whey are completely wasted, while much more yields a very low return in terms of the quantity of meat produced. However, the probable need to increase the output of pigmeat in the future without any proportionate increase in supplies of dairy by-products, coupled with the fact that there are less attractive alternative outlets for whey than for skim-milk or butter-milk, implies that in the years ahead whey will have to make a much more effective contribution to pigmeat production than it does now.

The necessary knowledge to permit the full exploitation of whey by pigs under New Zealand conditions is sadly lacking. The subject has been almost entirely neglected by New Zealand research workers, while the results of overseas work is of limited application because the levels of meal supplementation employed were higher than those considered economic here.

Heavy post-weaning losses, poor growth, and scouring are common features of whey feeding in this country, where the level of meal supplementation rarely exceeds 1 lb. per pig per day at any stage of fattening. Those characteristics of whey which are most likely to contribute to these adverse effects are its excessive water content, the high proportion of lactose and soluble salts, and the level of acidity and/or its variability.

The present investigation was started in 1955 with the aim of obtaining basic information concerning whey utilization by fattening pigs, particularly under conditions of low meal supplementation. Three main lines of approach, which are obviously closely interdependent, are being developed, namely:

- (1) A study of the physiological effects of heavy whey feeding.
- (2) The value of various supplements for use in conjunction with whey.

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- (3) The effect of different combinations of whey and meal feeding levels and various systems of feeding on efficiency of whey utilization.

### **Physiological Effects of Whey**

In view of the lack of information on the effect of high lactose intake on fattening pigs, a preliminary trial was carried out with 24 weaner pigs in which four levels of crude lactose, ranging from none to more than a pig on heavy whey feeding would consume, were fed in conjunction with meal plus limited water. Growth rate declined significantly with each increasing treatment level of lactose and this was particularly marked in pigs receiving the highest level. The latter group became very unthrifty and several members of the group started to scour persistently after some weeks had elapsed. Analysis of "snap" samples of urine revealed the presence of reducing sugars, the amount tending to increase with lactose treatment levels. The results of this trial suggest that, in common with other species which have been studied more extensively, the pig is adversely affected by high lactose intake. As with other species, there was considerable variation in the reaction of individual animals.

The results of a trial with concentrated whey, although designed primarily to obtain information relating to its meal replacement value, provide for speculation as to which particular features of whey are mainly responsible for its adverse effects in the pig. Four treatments, comprising different fixed meal allowances plus sufficient concentrate to give the same dry matter intake on all treatments at any given live-weight, were fed on a 20 per cent. higher plane of feeding than that used in the lactose trial. Over a live-weight range from 53 lb. to 110 lb., 2 lb. meal plus concentrate gave as good growth as the all-meal ration, but there was a progressive decline in growth rate at two lower levels of meal supplementation. The complete absence of scouring or any digestive upsets was a notable feature, especially in view of the high plane of feeding adopted.

The progressive decline in growth rate when less than 2 lb. meal per day was fed was probably due to the high lactose and/or salt intake. On the other hand, from previous experience, it is considered that the growth rate achieved by the pigs receiving only  $\frac{1}{2}$  lb. meal plus concentrate was more than would have been expected if fresh whey had been substituted for the concentrate, while excessive scouring would also have been anticipated. Assuming that no beneficial effect occurs as a result of the concentration process, the relatively superior results obtained with the concentrated material could have been due to either the reduced water content of the material, the

absence of an active microflora such as is present in fresh whey, the greater uniformity of the product compared with the day-to-day variations occurring in fresh whey, or a combination of these factors. Further trials are planned to elucidate these points.

### **Supplements for Use with Whey**

So far, only small observation trials have been undertaken. However, these suggest that access to grazing enables fattening pigs to consume greater quantities of whey without scouring than pigs receiving a similar meal allowance and confined indoors. There is some indication that a lucerne meal supplement has a similar effect for pigs fattened indoors, at least from the porker stage.

### **Efficiency of Whey Utilization**

In order to provide a basis for further work, information was required relating to the quantities of whey that pigs of different weight would drink in conjunction with limited meal, the relationship of efficiency of food utilization to level of whey feeding, and the significance of the scouring often associated with heavy whey feeding.

In a trial involving 24 pigs that averaged about 70 lb. initial weight, four levels of whey feeding were compared. A daily meal allowance of 1 lb. was provided on all treatments and whey quantities were adjusted so that for the four treatments the total dry matter consumption amounted respectively to 60 per cent., 80 per cent., 100 per cent and 120 per cent. of a feeding scale that had been used by D. M. Smith for skim-milk feeding. Growth rate increased with increasing levels of food intake and, since a fixed daily meal allowance was fed, the total amount of meal consumed was proportional to the time required to reach a given weight. However, total dry matter consumption was the same for the three highest levels until the porker stage, while that for the 60 per cent. group was greater. Subsequently, from 110 lb. to 180 lb., the 80 per cent. group had the lowest total dry matter intake, though the remaining levels were not significantly different.

Observations made up to the porker stage on the consistency of the dung voided on the different treatments revealed a relatively high incidence of scouring in the 120 per cent. group, somewhat less on the 100 per cent. level, and virtually none at the two lowest levels.

Carcass appraisal indicated that the 80 per cent. group approached nearest to the ideal, the 60 per cent. group were lacking in finish, while the 100 per cent. and 120 per cent. groups tended to be rather too fat.

With regard to whey consumption, under the conditions of the trial, which involved individual bail feeding four times daily, the 120 per cent. level exceeded appetite, an average of 6 per cent. of the whey being refused throughout the trial. Although no direct comparison can be made, a group of pigs provided with whey and a meal mixture containing 25 per cent. lucerne meal on a free-choice *ad lib.* basis consumed appreciably larger quantities of whey daily from the porker stage onwards, and there was only occasional scouring.

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In conclusion, the preliminary work which has been undertaken so far is merely a tentative approach to the problem. Much more investigational work is required before there is the necessary information to enable the whey supplies available to be used to the best advantage.

## DISCUSSION

Q.: *Could the speaker give further details on the cost and labour involved in producing the concentrated form of whey used in these trials?*

A.: To obtain a product that will keep satisfactorily, it is necessary to reduce the moisture content of fresh whey from 94 per cent. to about 40 per cent. This is a costly business and, although no concentration plant designed specifically for this purpose is in operation, it has been estimated that the cost per ton of whey solids would be of the order of £21 to £27. The economic feasibility of conserving the surplus whey at cheese factories in the flush of the season for use as a winter stock food is being investigated at the Dairy Research Institute. Commercially, at the higher price quoted, it probably compares unfavourably with, say, barley meal. However, for our experimental studies concerning the effect of whey constituents in pig rations, it is a most valuable product.

Q.: *Was dehydrated lucerne used?*

A.: No. The material to which reference is made was a lucerne hay meal of high fibre content.

Q.: *Did increasing the percentage of lactose in the diets result in lowering the protein content?*

A.: Yes. As the proportion of lactose in the various diets increased with increasing weight of the pigs, the proportion of protein necessarily declined. However, all pigs continued to receive  $\frac{1}{2}$  lb. meat meal daily throughout the trial and this was considered sufficient to meet the normal protein requirements at all stages.