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# PROFITABLE PIG-FEEDING

## The Importance of Protein

By K. M. HOPE, B.Sc. (Agric.), Agricultural Adviser

**T**HE food consumed by pigs during their transition from weaners to marketable porkers or baconers is the biggest single item on the pig-raiser's list of costs, so it naturally follows that if we can reduce food costs while still maintaining carcass weight and quality there will be bigger margins of profit when the pigs are sold.

Food costs may be reduced effectively by feeding the right foods in the correct proportions. No other method can give the quick growth, coupled with good carcass quality, which is the aim of the efficient pig-raiser.

Correct feeding makes for good food conversion rates—in other words we get more pigmeat for each pound of food consumed—and it is obvious that a pig which puts on 1 lb. of liveweight for each 3 lb. of food consumed is a much better commercial proposition than one which eats 5 lb. of food to produce a similar liveweight gain.

Correct feeding helps pigs to grow quickly and to develop carcasses containing fat and lean meat in the proportions which the bacon-curers and the consumers of pigmeats find most acceptable.

### THE PIG'S NUTRITIONAL NEEDS

A complete diet includes proteins, carbohydrates, fats, minerals and vitamins

plus crude fibre and ample supplies of good water.

The bulk of the pig's diet is made up of crushed grain which is rich in carbohydrates and has adequate fibre and phosphorous. An animal protein supplement and the calcium supplement detailed later, provide the supplementary protein fats, minerals and vitamins which are needed to build up the basic grain ration into an efficient production food.

Proteins may be of animal or vegetable origin but supplies of animal protein are essential if pigs are to be reared successfully. Good sources of animal protein for pig-feeding are meatmeal, whalemeal, dried whale solubles and separated milk. Young green crops and pastures and leguminous plants such as peas and beans are the main sources of vegetable protein available in Australia.

In general terms, the proteins are utilised in building up muscle, nerves, bone and blood—in other words they pro-



mote rapid growth—so ample protein is needed when pigs are young so that they grow quickly and lay the foundation for the finished carcass.

The carbohydrates are the energy-producing and fat-forming constituents of the diet.

### A BALANCED DIET

The best food conversion rates and the highest quality pigmeats with the desirable proportions of fat to lean, result from rations containing proteins and carbohydrates in the correct proportions.

Pigs which receive ample supplies of grain but are under-supplied with proteins will grow slowly. Apart from the fact that they will eat a lot of food to produce a small liveweight gain, the carcasses will be carrying too much fat and too little lean meat to realise top prices.

It is worth remembering, too, that while deficiencies in minerals and vitamins will usually result in obvious ill-health, pigs suffering from a deficiency of protein may appear healthy and continue to make some growth. It is only when they are marketed that their low carcass quality and poor food conversion rates become obvious.

## PROTEIN LEVELS

### Low Protein Means Slow Growth.

Remember always that it is the protein content of the feed that builds up bone and muscle. With this in mind it is easy to realise that young pigs need plenty of protein to enable them to develop rapidly.

They begin life on a protein-rich ration, for sow's milk contains over 30 per cent. protein (on a dry basis). From birth to three weeks of age the average pig increases from 3 lb. to 12 or 15 lb. in weight on its diet of sow's milk plus trace minerals preferably obtained by foraging in clean paddocks.

When they begin to chew dry feed at about the three-weeks stage, they should have a protein-rich mixture available at all times in a creep self-feeder which allows them to enter but keeps the sows out.

The feed mixture at this stage should be rich in protein (17 to 18 per cent.) and by the time the pigs are weaned at eight weeks of age they should weigh about 40 lb. each and be ideally prepared for rapid growth and early marketing.

As shown in the "Guide to Hand-Feeding," the pigs are fed on the 17 to 18 per cent. protein mixture until they reach

## GUIDE TO HAND-FEEDING

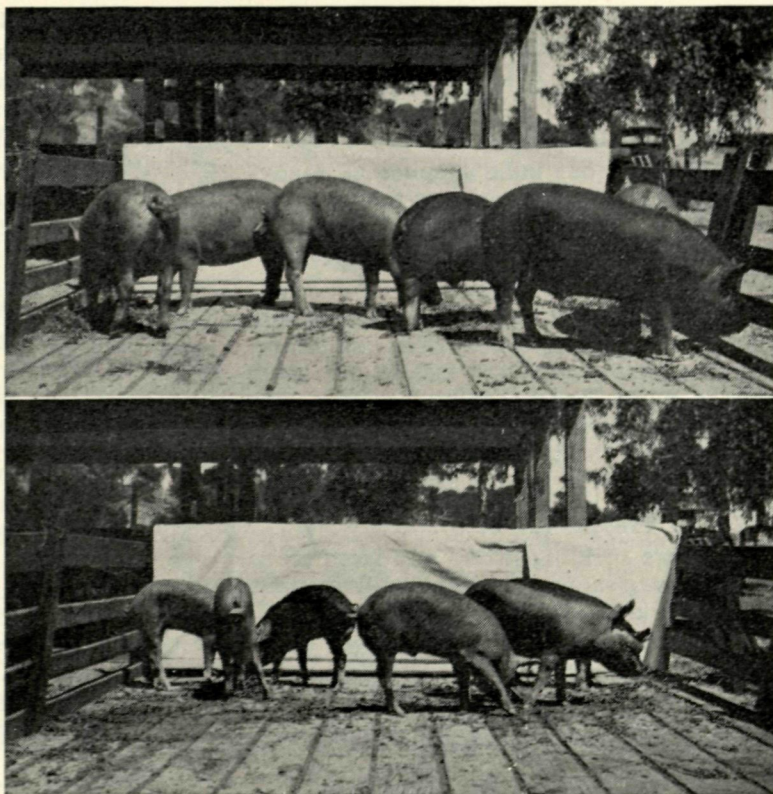
*Showing the approximate daily quantities of food required per pig when either separated milk or meatmeal, whalemeal, etc. are given as protein supplements (1½ gallons of separated milk being equivalent in protein content to 1 lb. of 50% meatmeal).*

Age and Classification	Approximate liveweight	Protein Supplement		Carbohydrate food, crushed wheat or equivalent	Approximate overall percentage protein in total ration
		Separated milk	Meatmeal or equivalents (50% protein basis)		
	lb.	gal.	lb.	lb.	%
3-8 weeks sucker	12-40		creep-self-feeder ration		18
8-10 weeks weaner-slip	40-50	1	1	1-2	18
10-14 weeks grower	50-80	2	2	2-3	16
14-18 weeks light porker	80-110	3	3	3-4	15
18-22 weeks heavy porker	110-140	4	4	4-5	14
22-28 weeks light and medium					
baconer	140-200	2	1	5-6	13
Heavy baconer	200 plus	3	2	6	13
In-pig sows and boars		1½-2½	1-1½	6-9	16
Sows and litters		3-4½	2-3	8-12	17-18



Fig. 1.—All the pigs shown in these two photographs started as weaners with an average liveweight of 40 lb. They were of similar breeding and all were six months old when the photographs were taken

Those in the top picture were fed on balanced rations of meatmeal and crushed grain. Those in the lower picture were fed on crushed grain alone



about 50 lb. liveweight, after which the protein level is progressively reduced.

A mineral supplement as described later should be fed in addition to the grain and meatmeal.

### POINTS ON HAND-FEEDING

The feeding tables are prepared only as a general guide, although they have proved highly satisfactory in actual practice. It must be remembered that no feeding tables can completely replace the first-hand knowledge which the pig-raiser gains by observation of his stock.

In the case of in-pig sows, for instance, care must be taken to ensure that they do not become too fat. Over-fat sows often have difficulty in farrowing, are more liable to crush their piglets and seldom milk satisfactorily.

Boars and pregnant sows normally do well on a ration with 16 per cent. protein, or approximately the same level as that fed to growing pigs in the 50 to 80 lb. liveweight range.

Sows with litters should receive a mixture containing 17 to 18 per cent. protein because they must produce protein-rich milk for the piglets.

It will be seen by the table that a balanced ration can be provided by feeding a fixed quantity of protein supplement from weaning to marketing. In the case of 50% protein meatmeal, this would be about  $\frac{1}{2}$  lb. per pig per day with a gradual increasing quantity of grain.

A "rule of thumb" guide for feeding crushed wheat (or the equivalent in carbohydrate-rich foods) would be 1 lb. per pig per day for each month of age, with the rule only applied when weaning is completed and the daily intake of the slip has reached 2 lb. or more. This corresponds to about 1 lb. of grain per day for each 28 lb. of liveweight.

When hand-feeding baconers the grain ration should not exceed 6 lb. per pig per day and the protein level should never go below 13 per cent. or the food conver-



sion rates will suffer and more food will be needed to give the required liveweight gain.

### SELF-FEEDING SAVES LABOUR

By putting out bulk supplies of ready-mixed feed in self-feeders, so that the pigs can help themselves at all times, considerable time is saved and one man can attend to a larger number of pigs.

For self-feeders it is customary to use only three grades of rations as shown below, in fact many pig-raisers use these grades when hand-feeding as they give results almost equal to those achieved by the gradual changes in the hand-feeding table. The three grades are as follows:—

#### 1. High Protein (17-18%).

For sows suckling litters and from creep and weaner stages to 70 lb. liveweight (light porker).

15 lb. meatmeal, 100 lb. crushed grain  
1 lb. limestone fines.

#### 2. Medium Protein (15-16%).

For in-pig sows, boars and from light porker to 100 lb. liveweight (medium porker).

10 lb. meatmeal, 100 lb. crushed grain,  
1 lb. limestone fines.

#### 3. Low Protein (13%).

From medium porker to baconer weights.

5 lb. meatmeal, 100 lb. crushed grain,  
1 lb. limestone fines.

The meatmeal referred to is that containing 50 per cent. protein. If the meatmeal or whalem meal used has a higher or lower protein content, the quantities will need to be reduced or increased accordingly.

When using self-feeders it is advisable to market pigs at slightly lower liveweights than those recommended for hand-feeding. This is because pigs on unrestricted feeding tend to lay on more fat. A modified self-feeding technique will allow pigs to be finished on a restricted ration, once they have grown rapidly to about 100 lb. liveweight. This requires a changeover from grains such as the wheat and barley to the more fibrous oats.

### IT PAYS TO CRUSH THE GRAIN

All grain should be coarsely crushed for pigs as the improvement in utilisation far outweighs the cost of crushing.

Wheat at 10 to 12 per cent. protein content and 2 per cent. fibre is the most concentrated grain for pig-feeding.

Barley at 9 to 12 per cent. crude protein content and 5 to 6 per cent. fibre is suitable for pig-feeding and can be used successfully for all classes of pigs.

Oats at 9 to 11 per cent. crude protein and 9 to 12 per cent. fibre are too fibrous for young pigs but are ideally suited for in-pig sows, boars and for finishing baconers on self-feeders. The fibre limits the intake by these pigs and prevents them becoming overfat.

Mixed grains are also very palatable to pigs, but young pigs up to 100 lb. liveweight should not receive more than 25 per cent. oats in their crushed grain ration or growth will be slowed down.

As a guide to budgeting, 60 lb. of wheat can be replaced by 66 lb. barley or 75 lb. of oats.

### MINERAL SUPPLEMENTS

Salt at  $\frac{1}{2}$  lb. per 100 lb. of crushed grain, and ground limestone at 1 lb. per 100 lb. of crushed grain would normally be the only mineral supplement required by most pigs, as cereal grains are rich in phosphorus. Where pigs receive a gallon or more of separated milk they should not require ground limestone as the milk is rich in calcium (lime). If the water supply contains more than 100 grains of salt to the gallon, a salt supplement will not be necessary.

Copper deficiency can cause leg weakness in pigs, but may be prevented by grazing the animals in paddocks which have been topdressed with a bag to the acre of copperised superphosphate. One top-dressing should suffice for seven or eight years.

Where pigs are sty-fed in the wheatbelt, it would be advisable to feed the following mineral supplement at the rate of  $\frac{1}{2}$  lb. to 100 lb. of grain:

Dissolve 8 oz. of copper sulphate (blue-stone) and 2 oz. of zinc sulphate in two pints of hot water. Sprinkle the solution over 100 lb. of salt and mix thoroughly.



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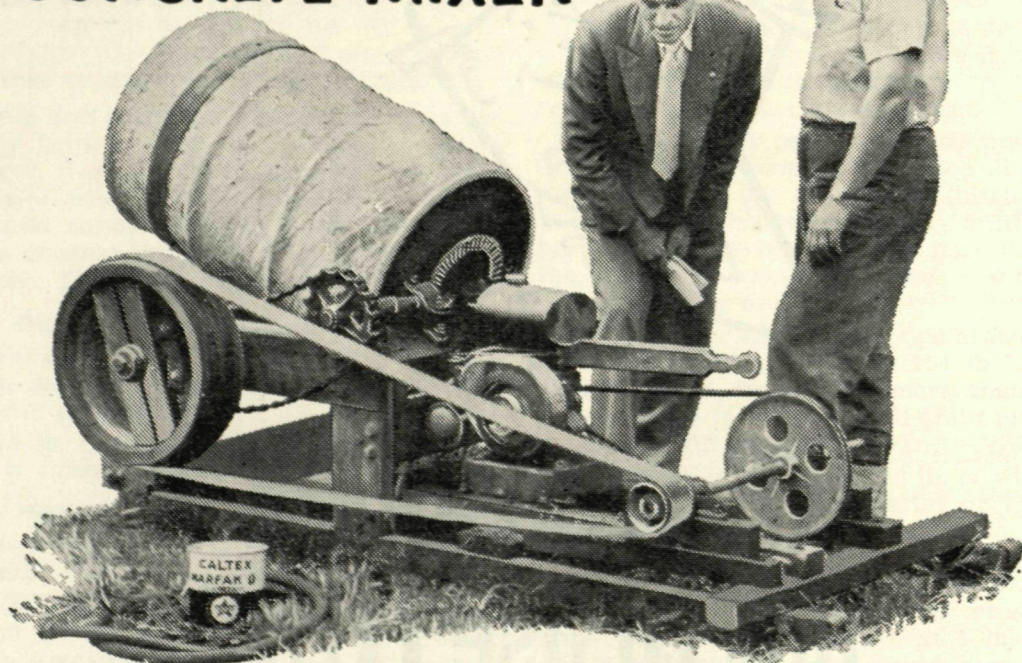
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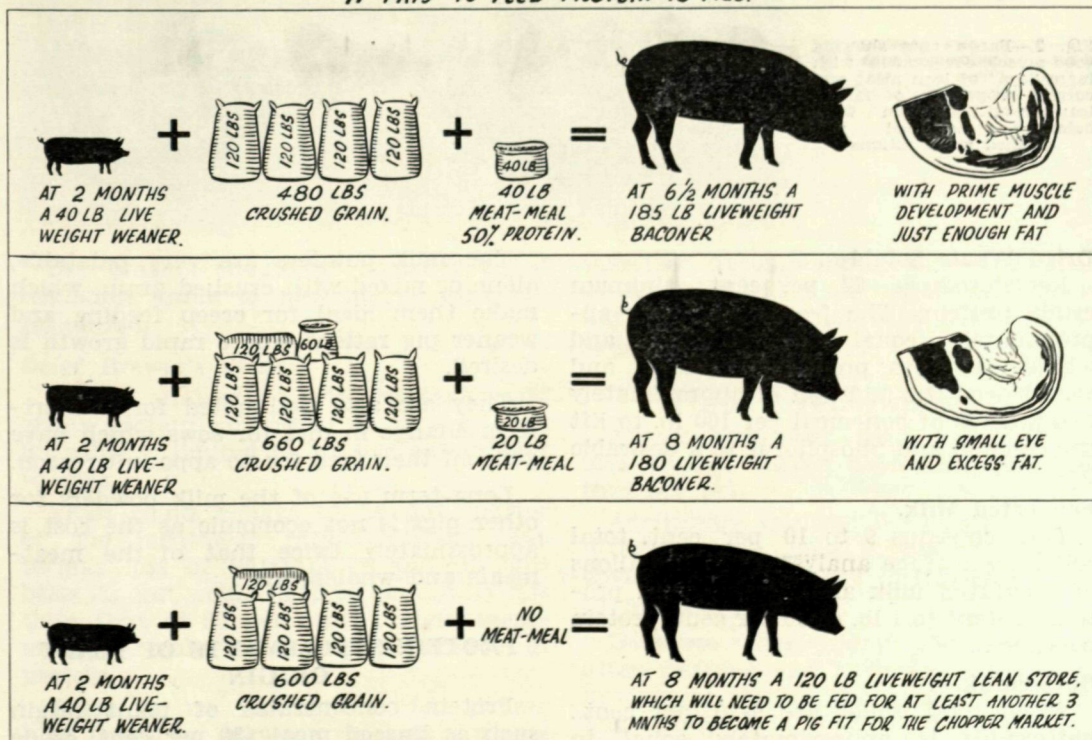
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Sow's milk is naturally low in iron and copper and cannot be improved by feeding extra iron and copper to the sow. A deficiency in the young pigs may be prevented by allowing them to run out on clean pasture or by giving them a fresh clod of earth from clean ground each day. Alternatively, the udder of the sow may be sprayed with an iron, copper and sugar solution. If the in-pig sow's mineral intake is satisfactory, the iron and copper reserves in the liver of the new-born piglet should be high enough to avoid trouble as long as they can run out on clean ground.

### ANIMAL PROTEIN NECESSARY

With the pig, part of the protein must be of animal origin or growth will suffer. Animal protein contains Vitamin B12 and related substances which are together called the Animal Protein Factor (A.P.F.). These substances do not occur in plant protein.

When the protein supplements are meatmeal, skim milk, etc., there would be no difficulty with animal protein short-

ages as a couple of ounces (dry weight) each day, would provide enough A.P.F. for good growth in pigs. If only a couple of ounces of animal protein is fed per pig per day, the balance must be made up with vegetable protein as growth will not be satisfactory if overall protein is insufficient.

### PROTEIN SUPPLEMENTS OF ANIMAL ORIGIN

#### Meatmeal.

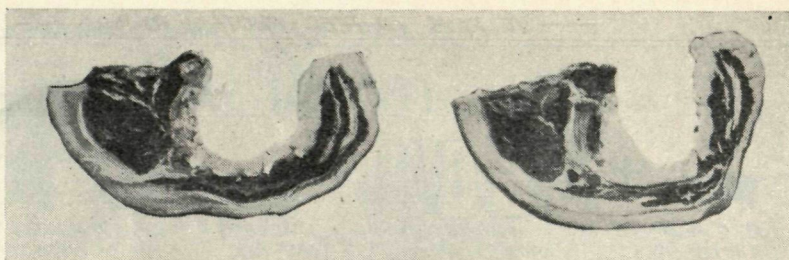
Midland Junction meatmeal is registered as 50 per cent. minimum crude protein with others down to 27 per cent. crude protein. The amount fed would be regulated according to the protein content from analyses and biological value as revealed by growth of the pigs.

#### Whalemeal.

Various brands are registered from 62 per cent. minimum crude protein to 53 per cent. minimum. It may be fed to completely replace meatmeal on a proportionate basis.



Fig. 2.—Bacon cuts showing good muscle development with large "eye" of lean meat and correct proportion of fat to lean resulting from well-balanced meatmeal and crushed grain rations



### **Dried Whale Solubles.**

Registered as 82 per cent. minimum crude protein. The feeding value is approximately equal to meatmeal and whalemeal on a protein unit basis, and would need the addition of approximately two pounds of bonemeal per 100 lb. to lift the calcium and phosphorus to a desirable level.

### **Separated Milk.**

This contains 9 to 10 per cent. total solids on average analyses, and  $1\frac{1}{2}$  gallons of separated milk are equivalent in protein content to 1 lb. of 50 per cent. protein meatmeal.

### **Buttermilk.**

When total solids are 9-10 per cent., buttermilk is approximately equal to separated milk, gallon for gallon. If it has been diluted with washing water and the total solids reduced to 5-6 per cent., then two gallons would be required to replace 1 gallon of separated milk.

### **Whey.**

Undiluted whey contains between 6 and 7 per cent. dry matter. This dry matter contains approximately 15 per cent. protein, which is principally albuminous as the casein has been extracted in the cheese-making process. Pigs from weaning to 70 lb. should receive normal meatmeal supplements, and from 70 lb. to 100 lb. half the normal meatmeal supplement in addition to the grain and whey. Pigs 100 lb. and over can grow well on crushed grain and whey plus the mineral supplements.

### **Dried Separated Milk and Dried Buttermilk Powders.**

Typical analyses show 32 to 34 per cent. crude protein. This milk protein is usually of better quality than that contained in meatmeal, enabling the milk powders to replace meatmeal on a pound for pound basis.

The milk powders are very palatable, alone or mixed with crushed grain, which make them ideal for creep feeding and weaner pig rations where rapid growth is desired.

They are also well-suited for a short-term change in diet for sows which have gone off their feed for no apparent reason.

Long-term use of the milk powders for other pigs is not economic as the cost is approximately twice that of the meat-meals and whalemeals.

## **PROTEIN SUPPLEMENTS OF PLANT ORIGIN**

Protein concentrates of plant origin such as linseed meal (30 per cent. crude protein) are normally scarce and highly-priced on a protein unit basis. Oil-extracted cottonseed meals, soya-bean meals, groundnut (peanut) meals and similar products are not available here although much used overseas. Field peas and similar legume seed crops can supply all the protein, save for the small amount of animal protein needed to supply A.P.F. and the pig can harvest them itself.

On a practical basis, actively-growing green pasture or crops would be the main economic source of plant protein in Western Australia.

Apart from protein, the greatest value of green crops or green pasture is as a source of Vitamin A. Vitamin A is essential for normal reproduction in pigs and if no greenfeed is available a Vitamin "A" supplement should be supplied to breeding pigs.

As a source of protein, young green pasture is very satisfactory, but because of its bulk, it could not be expected to supply any more than half of the protein supplement, even when unlimited in supply.



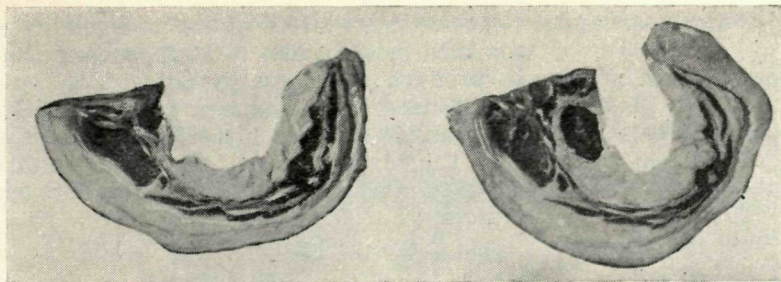


Fig. 3.—Small eye muscle with a lot of fat and very little lean—the result of low protein levels

Dry grazing should be regarded as of negligible value to pigs and a complete ration fed.

### **Dried Brewer's Yeast.**

Typical analyses of dried brewer's yeast give a protein content of 42 per cent. but its value is limited by its low palatability to pigs.

Yeast could replace up to one-quarter of the meatmeal ration without any serious loss of palatability and on this basis its cost would need to be slightly less than that of 50 per cent. protein meatmeal to make it a payable source of protein.

There is no justification for paying high prices for brewer's yeast as a source of Vitamin B. The recommended meatmeal and crushed grain rations—with or without green grazing—are not deficient in the B Vitamins.

### **ANTIBIOTICS AND APPETITE PROMOTERS**

The antibiotics, procaine penicillin, aureomycin and terramycin all act as appetite promoters; boosting the daily intake of feed and thus the daily gain. In approximately 50 per cent. of trials, the antibiotic improved feed conversion sufficiently to cover its own cost.

When feed cost is a major consideration, be sure that other limiting factors such as protein intake are not reducing growth rates and feed conversion to unsatisfactory levels. Meatmeal or equivalents should be bought and used at recommended levels before investing in growth promoters.

Fast unrestricted growth from birth to market is ideal for economy of feed conversion on normal rations. This can be obtained by good rations to healthy stock in good clean paddocks and pens. It is

therefore recommended that the antibiotics be saved for any particularly backward groups and not used over all pigs as a general practice.

### **DON'T FEED WORMS**

Always remember that worm-infested pigs cannot thrive, no matter how well they are fed.

Admittedly, the well-fed pigs suffer less ill-effects from worm infestation but it is obviously a bad policy to buy costly feed to nourish parasites.

De-worm your young pigs one week after weaning and keep down the worm burden by resting the grazing paddocks under crop.

### **WATCH THOSE GROWTH RATES**

The pig-raiser who has to wait up to four or five months to get a return from his porkers, or six to seven months to rear a baconer, should keep a careful check on his growth rates.

In the case of a producer of eggs or milk, any fall in the protein content or the general quality of the feed is almost immediately reflected in the daily production and can be rectified without delay, but unless the pig-raiser pays careful attention to the growth rates and frequently checks the time which elapses between farrowing dates and marketing, he could be feeding his pigs uneconomically for long periods without realising the fact.

That is where a good set of scales could be helpful, both for checking the quantities of feed consumed and for keeping the pig-raiser informed of the liveweight gains which the feed is producing.

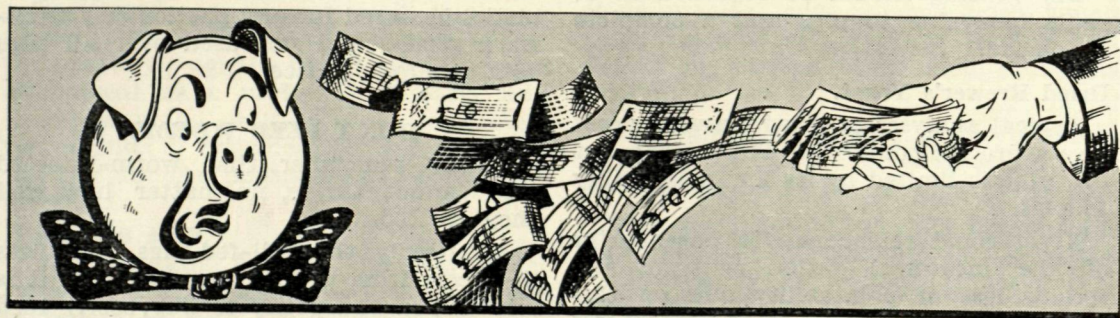
In the hand-feeding sphere, excellent results of 3.1 lb. to 3.6 lb. of total feed per 1 lb. liveweight gain have often been re-



corded, with rapid weight increases and good carcass quality.

A 3.6 lb. conversion rate would mean that to grow from 40 lb. to 180 lb. liveweight, a pig would consume 520 lb. of feed consisting of 480 lb. of crushed grain and 40 lb. of meatmeal (50 per cent. protein).

As the diagram shows, the reduction of the meatmeal intake to 20 lb. meant that to produce the same liveweight the pig would need to consume a further 180 lb. of grain (680 lb. of total feed) and even then the carcass would be of lower quality with too much fat and a smaller eye muscle.



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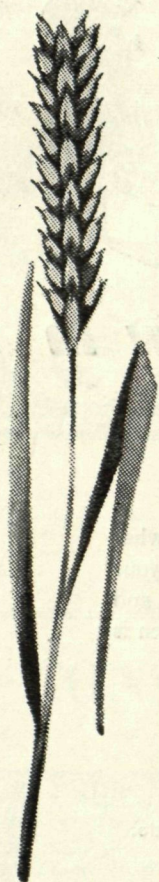
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