



*Farm Wastes as*  
**SWINE FEEDS**

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# *Farm Wastes as* **SWINE FEEDS**

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Values of different feeds vary. Results of a feed program depend on the amounts of total digestible nutrients included and the way in which they are used. Balanced rations are important also. It is important that the ration contain proper amounts of protein, carbohydrates, vitamins and minerals.

In addition to the composition of the feed itself, feeding results will depend greatly on the methods of management. Much feed will be wasted with poor equipment or unsanitary surroundings. There are many other items in connection with good management that affect the results obtained.

It is the purpose of this bulletin to present information on feed values. The facts are based on the work of the Experiment Station and its branches, and upon the observations of successful swine-production farms throughout Oregon.

## **Comparative Value of Hog Feeds**

In the table which follows, ground barley fed alone is used as the standard with which other feeds are compared. The actual (cash) values vary somewhat with the quality of the feeds, and the age and condition of the animals. The figures given are based on extensive feeding tests at the Central and Branch Experiment Stations. It should be noted that pigs vary greatly in their feeding capacity and that, with small lots, variations of 15 to 25 per cent in gains on the same feed are not uncommon. In large numbers the variations tend to counteract each other and therefore make the results more reliable. The figures given for the grains are considered to be accurate within 2 per cent, but the figures for supplements are much more variable. The tendency has been to be conservative and the actual results of the tests with supplements run higher, rather than lower, than the figures listed in the table.

### **Grain and mill feeds**

The grains and mill feeds are the basis of all pig feeding and for any purpose except mere maintenance they must form the larger part of the ration. Pastures should be considered as a means of saving grain. Research on irrigated pastures for hogs is reported in Experiment Station Circular of Information 490, available from county extension agents.

## RELATIVE VALUES OF FEEDS

Feed	Digestible nutrients per 100 pounds	Relative value <sup>1</sup>	Manner fed
<i>Grain and mill feeds</i>			
Barley, ground .....	79	100	As the chief grain ration.
Barley, whole .....	79	88	As the chief grain ration.
Wheat, ground .....	80	100	As the chief grain ration.
Wheat, whole <sup>2</sup> .....	80	88	As the chief grain ration.
Corn, ground .....	81	100	As the chief grain ration.
Corn, whole .....	81	95	As the chief grain ration.
Oats, ground .....	70	90	Not more than $\frac{1}{3}$ of grain ration.
Oats, whole .....	78	105	Not advisable.
Middlings .....	78	100	For sows and younger pigs.
Middlings .....	78	100	For fattening hogs. (Not more than $\frac{1}{3}$ of ration.)
Shorts .....	69	95	For sows and younger pigs.
Shorts <sup>3</sup> .....	69	90	For older hogs. (Not more than $\frac{1}{3}$ of ration.)
Bran .....	61	75	For maintenance only. (Contains too much fiber for fattening.)
Cocconut meal .....	80	100	Not more than $\frac{1}{4}$ of the ration.
<i>Supplemental feeds</i>			
Skim milk or buttermilk .....	9	33	Not more than 3 pounds of milk with 1 pound of grain.
Tankage, 60 per cent ....	87	300	5 to 10 per cent of ration.
Oilmeal .....	79	150	10 to 20 per cent of ration.
Soybean meal .....	83	190	8 to 15 per cent of ration.
Cottonseed meal .....	.....	.....	Dangerous for pigs.
<i>Succulent feeds</i>			
Potatoes, raw .....	17.1	17	Not more than 2 pounds to 1 pound grain.
Potatoes, cooked <sup>4</sup> .....	17.1	25	Not more than 4 pounds to 1 pound grain.
Mangels or turnips .....	7.4	12	Not more than 3 pounds to 1 pound grain.
Rutabagas .....	9.4	15	Not more than 3 pounds to 1 pound grain.
Sugar beets .....	14	20	Not more than 4 pounds to 1 pound grain.
Silage .....	17.7	.....	Not suitable for pig feeding.
<i>Roughage feeds</i>			
Alfalfa hay, chopped alfalfa or alfalfa meal <sup>5</sup> .....	52	75	Not more than 15 per cent of ration.

<sup>1</sup>Relative values apply only when feed is used as indicated.

<sup>2</sup>Whole wheat when fed through as self-feeder is as valuable as ground wheat.

<sup>3</sup>Not as valuable for older hogs as for sows and pigs.

<sup>4</sup>Feed value is on basis of weight before cooking.

<sup>5</sup>Compare on basis of amount actually eaten. Chopping or grinding saves some waste, especially in wet weather. Amount to use will be governed by the price.

## Supplemental feeds

Supplemental feeds are used with grain and mill feeds to provide the constituents commonly lacking, thus making the entire ration more useful to the animal. When so used, these supplemental feeds give returns far in excess of what their total digestible nutrients would indicate. When used in large amounts, however, they are both expensive and unsatisfactory. More than one supplement need not be used in the same ration. With good legume or rape pasture none is needed.

### Succulent feeds

Scientific experiments and common farm experience have demonstrated the value of adding succulent feeds to the rations for live-stock. The laxative effect keeps stock healthy.

Because of their beneficial effect upon the digestive system, succulent feeds give unusually good returns in proportion to the nutrients contained. High water content prohibits feeding them in large amounts. For example, it would take 100 pounds of mangels per day to supply sufficient nutrients for a 200-pound fattening pig.

### Roughage

Roughage is feed that in a dry condition contains 20 per cent or more of crude fiber (usually 25 to 35 per cent). The entire ration for a fattening or growing pig should not contain more than 8 per cent of fiber. Very limited amounts of roughage, therefore, can be used for pig feeding. Roughage for pigs is nearly always from some of the legumes, since they contain certain protein, vitamin, and mineral constituents which the grains and mill feeds lack. In this way they take the place of supplements. Legumes are not as satisfactory as tankage or milk for that purpose, since they cannot be fed in sufficient amounts without forcing the pig to eat too much fiber.

## Home-Grown Feeds

On Oregon farms there are a number of products usually considered waste, which offer an opportunity to produce hogs profitably. Some grain should always be fed with them, but feeding these wastes will reduce the amount of grain required. The use of waste crops plus grain and the addition of protein concentrates and minerals contribute to a balanced, yet economical feed.

Home-grown grain usually will be cheaper than purchased grain. By comparing feed values you can grow the kind of grain that will produce the largest number of pork-pounds per acre.

Corn, wheat, and barley are approximately equal in feeding value. Under Oregon conditions, one of these usually can be produced to advantage over another. Pasture crops always should be a part of the hog-production program. Suitable pastures will reduce the amount of other feeds required from 10 to 30 per cent.

For your hog production enterprise, therefore, give consideration to home-grown grain, waste products, and pasture. A combination of these usually will make it possible for you to raise some hogs on your farm profitably.

## Waste Products

What do we mean by waste products? Among the wastes valuable as swine feed are garbage, skim milk, cull potatoes, cull fruits and vegetables, damaged grain, screenings, and many others. Nearly every Oregon farm has some of these or similar wastes. Many have been fed experimentally to determine their value.

### Damaged wheat or barley

Oregon produces many acres of wheat for milling purposes. Usually it is too high in price to be considered for livestock feeding.

Barley is produced in considerable acreage. The variety most commonly grown in Oregon is used largely for brewing purposes, with the price often too high for consideration in a livestock feeding program.

There are certain conditions under which both of these grains can be purchased at a price to make them practical for feeding. The variety grown will influence costs. Very often barley and wheat are frosted in certain areas, making the grain undesirable for either milling or brewing. Wheat frequently is sunburned beyond use and all grains may be fire damaged. Frosted and sunburned grains are usually as satisfactory for hog feeding as undamaged grains and can be used in the same manner. Feed value, of course, will depend upon the degree of damage and it is suggested that a protein analysis be obtained on such lots of grain. Such an analysis may be obtained through the Agricultural Chemistry Department at Oregon State College.

Damage from fire may be due mainly to smoke and the kernels may not be badly scorched. The food value often will be nearly as high as that of undamaged grain, but the palatability of scorched grains will be somewhat lessened. They can be used either alone or in combination with pastures and some of the other waste products found on Oregon farms.

### Skim milk or buttermilk

Under present methods of marketing, milk is usually sold as whole milk. There are places where poor transportation and storage facilities make skim milk and buttermilk available for hog feeding. Skim milk and buttermilk are about equal in feeding value when fed with grain. The amount recommended is 1 pound of grain to 3 pounds of milk. Skim milk and buttermilk rate at the top as a protein supplement. When from 4 to 6 pounds daily per pig are available, no other protein supplement is required in swine feeding.

## Whey

Whey for swine is worth about one-half as much per 100 pounds as skim milk. It should always be pasteurized to prevent the spread of disease and should be fed in clean containers. Whey and grain fed to young pigs should be supplemented with linseed meal or wheat middlings to balance the ration. Pigs weighing 100 pounds or more, however, will make excellent gains when fed whey, barley, or wheat, without any high-protein supplement.

## Potatoes

The heavy production of potatoes in various sections of the state affords a certain amount of culls which are very satisfactory as a swine feed. When cull potatoes are fed raw, 600 pounds are equal to 100 pounds of grain. If they are cooked, 400 pounds of the cooked potatoes will equal 100 pounds of grain in value. It is advisable to feed the cooked potatoes at the rate of 4 pounds of potatoes to 1 pound of grain.

Potatoes should be steamed or cooked in a vat until they are mealy or until the skins burst. Because cooking grain reduces its feed value, it should not be added until after the potatoes are cooled.

Palatability of cooked potatoes will be improved by the addition of 2 pounds of salt to each 100 pounds of potatoes at the time of cooking. When water is left in the bottom of the container after cooking it should be discarded. The water is unpalatable and may be too salty for safe feeding.

It should be remembered that the sprouts from stored potatoes should be removed as they contain a poisonous material which may cause difficulty.

## Root crops

On some farms there may be entire crops of mangels, rutabagas, carrots, and such that are not marketable. These root crops are high in moisture. They can be used raw for swine but should not be fed at a higher rate than 3 pounds of roots to 1 pound of grain. They should be as free as possible from dirt and foreign material.

Sugar beets are somewhat higher in value than the other root crops mentioned, due to the high sugar content. These should be fed at the rate of 4 pounds to 1 pound of grain.

It should be mentioned that carrots are high in carotene. Other roots and tubers have very little or no Vitamin A value. It would be wise in using these crops, therefore, to consider the use of alfalfa meal or cod liver oil products to keep the animals in thrifty condition.

### **Pumpkins and squash**

Pumpkins are not satisfactory as the sole feed for pigs. They may be satisfactory along with grain and a protein supplement. Recommended rate of feeding is 1 pound of grain to 2 pounds of pumpkin. It will take 1,000 pounds or more of pumpkins to be equal in value to 100 pounds of grain in hog feeding. Cooking pumpkins for swine is not recommended. Contrary to popular thought, pumpkin seeds have not been found harmful in hog feeding. Feeding the seeds alone, however, may cause indigestion because of the high fat content of the seeds.

The Colorado Experiment Station has experimented in feeding hogs exclusively on squash. The meat had a good flavor but the fat had an undesirable yellow color. Squash should be fed with grain in about the same proportion as pumpkins.

### **Cull dry peas**

Cull dry peas are available in certain areas of the state and there is a strong demand for them as a livestock feed. Peas are high in protein and for that reason they can be mixed with grain to very good advantage. They are not likely to be quite as palatable when fed alone as barley or wheat. Because of the high protein content, it would help to balance the ration if they made up approximately one-fourth the total feed mixture.

### **Vetch seed**

Many acres of vetch are grown in western Oregon. Some vetch is threshed for seed and for that reason there may be a reasonable supply on the market as livestock feed. Vetch seed is similar to pea seed in composition. It is not as palatable, however, and should not be used for more than 15 per cent of the grain ration. Frequently, the batches of grain offered for feed contain considerable vetch seed. If the proportion is higher than 15 per cent the hogs will not accept it readily.

### **Dried prunes**

While Oregon's prune acreage has gone down there will still be occasions when there will be some low-grade dried prunes offered for livestock feed. In an experiment conducted at Oregon State College it was found that dried prunes are about 60 per cent as valuable as ground barley when fed at the rate of about 2 pounds of prunes to 1 pound of grain. It was also found that the French prune was somewhat more valuable than the Italian prune for feeding purposes. Where the prunes had been pitted their feeding value was about 10 per cent higher.

### Dried pears

In the southern Oregon districts many tons of cull pears are available for livestock feeding. Some of these have been fed without drying, with good results reported. They are fed with some grain, usually 1 pound of grain to each 3 or 4 pounds of pears.

Cull pears have been fed sliced and sun dried. In experiments at Oregon State College it was found that dried pears were about 80 per cent as valuable as grain when fed at the rate of 2 pounds of dried pears to 1 pound of grain. In the experiments hogs weighing 60 to 100 pounds consumed around  $3\frac{1}{2}$  pounds of dried pears daily in addition to about half that amount of grain. In connection with the feeding of pears, a protein concentrate was included in the grain mix. Pears may prove laxative and should be fed with care.

### Apples

In an experiment conducted in Utah where apples were fed to pigs, it required from 9 to 15 pounds of apples to equal 1 pound of grain. Because of the high water content of apples, they are not very satisfactory as a hog feed. They should be fed in limited amounts and always with ample grain to keep the hogs gaining. Apples are very palatable to all classes of livestock and when the livestock are allowed to run to the apples free of choice they are likely to fill up on them and not eat grain.

### Garbage

There is always a certain amount of table waste or garbage available in connection with family living. Large amounts of it are sometimes available in nearby towns or cities. City garbage usually is contracted by someone who makes a business of feeding it commercially. Because of the danger from disease it is important that he consult the State Department of Agriculture to obtain the information on the sanitary requirements for such a venture. Feeding garbage from the family table should be safe.

The value of garbage varies greatly. If it runs high in meat or cereal products, its value is greater than if it is made up largely of vegetables and leafy foods. The amount of grain to feed with garbage must be left entirely to the judgment of the operator, as it will depend on the composition of the material. Foreign materials such as glass or broken porcelain, naturally, should be kept from the garbage container, as should soap and coffee grounds.

The coffee grounds make the garbage unpalatable and the soap is likely to cause scouring or even death loss.

### **Bakery wastes**

Sometimes stale bread or other bakery wastes can be obtained at a price sufficiently low to allow their use as hog feed. Such wastes can be used in place of or as a part of the grain ration. It should be considered, however, that bread contains about 30 per cent water. Bread is ordinarily worth about three-fourths as much as grain in food values.

### **Miscellaneous wastes**

The more common waste products have been mentioned. There are many others that have feeding value for swine. For example, in connection with the canning of peas, there are some that are too mature or otherwise unsuitable for canning purposes. At present most of these are destroyed. If they could be obtained, undoubtedly they would be palatable hog feed, but would have a high water content. It would be necessary to feed at the rate of 2 to 3 pounds of peas to 1 pound of grain. There seems to be no experimental information on the best way to feed them.

Another crop that has been used by Oregon swine breeders is the waste that comes from the nut industry. This material runs high in oil but also carries a high per cent of protein. No analysis of this product is available. Undoubtedly nuts could be fed as a protein supplement, using 1 part of the nut waste to 3 parts of grain.

## **Pasture**

Pasture is not a waste crop but it should be considered in connection with all swine production enterprises. It saves grain. There are many types of pastures that are suitable for swine, perhaps the best being rape, clover, and alfalfa. There may be situations, however, where it is not possible to produce these crops. If not, grasses or grain crops can be used. While they are not as valuable as rape, clover, or alfalfa, they will reduce the amount of grain required to produce 100 pounds of pork. Best results are obtained on young, tender forage growth. It is good management, therefore, to clip the growth that is coarse and "woody."

## **Minerals**

Grain and other feeds do not contain sufficient minerals to supply the fast growing or gaining hog. A mineral mixture made up of iodized salt, ground limestone, and sterilized steambone meal, in equal parts, should be kept before the hogs at all times. This mixture will supply the minerals usually lacking in the feeds.

## Management Tips for Hog Production

- ▶ National figures indicate that 40 per cent of the pigs farrowed never reach weaning age. Two-thirds of these losses are due to faulty management, sanitation, and nutrition. This is further aggravated by cold, wet weather during farrowing time. Every pig farrowed dead represents 140 pounds of feed wasted. Any pig dying between farrowing and weaning represents a loss of  $1\frac{3}{4}$  pound of feed for each day it lives.
- ▶ Purdue University found that when sows were fed only grain and mineral supplements, 44 per cent of the pigs had died by the end of the first week. With the same sows receiving added protein supplement, the pig loss was only 11 per cent.
- ▶ Warm, dry farrowing quarters make a difference in birth survival. The temperature suggested for pig brooders is between 50° and 60° F. Sows become restless at 60° while at 50° the baby pigs become chilled.
- ▶ Sloping floors in the farrowing houses have been found of merit in cutting down losses from crushing by the sow. The slope should be one inch to the foot. Oregon breeders in many cases use electric brooders as a means of saving young pigs. Others use farrowing crates. Every farrowing pen should have guard rails around the wall to protect the pigs. *It has been found that it is necessary to save about 5 pigs from each litter in order to pay expenses. Anything more than 5 pigs, then, represents a profit.*
- ▶ Use good sanitation practices to prevent worm infestation. Clean sows, clean farrowing pens, and clean yards or pastures, from the standpoint of disease and internal parasites, are most important.
- ▶ Make maximum use of good green pasture for sows and gilts during pregestation, gestation, and lactation periods. This should be continued after the pigs are weaned. Pasture saves from 10 to 30 per cent of the grain required in putting on gains.
- ▶ Whenever green pasture is not available, the total ration during pregestation, gestation, and lactation should contain at least 10 to 15 per cent of high-quality alfalfa meal or ground, green, leafy alfalfa hay.
- ▶ Include oats, wheat middlings, or similar feeds with grain and supplements in the gestation and lactation rations of sows and gilts.

- ▶ Consistently use an efficient protein supplement with necessary vitamins and minerals in the rations of bred sows and gilts. Protein supplements are helpful to pigs throughout their life. Remember that animal proteins, such as skim milk and the meat meals, are most valuable. Vegetable proteins, such as linseed or soybean meals, are helpful but lack the quality found in animal proteins. Recent discovery of a so-called "animal protein factor," which is actually Vitamin B-12, shows promise of improving vegetable proteins by adding 2 to 5 pounds of this material to each ton of vegetable protein. Recent experiments indicate that vegetable proteins are as valuable as animal proteins.
- ▶ It is wise to supply your bred gilts and sows and young pigs with free access to stabilized, iodized salt.
- ▶ Give sows and pigs free access to a mixture of supplemental minerals. Equal parts of salt, sterilized steambone meal or flour, and ground limestone supply elements usually lacking.
- ▶ Avoid abrupt changes in the ration of sows before farrowing. When sows are penned for farrowing, reduce the ration slightly and prevent constipation by adding a handful or more of linseed meal or wheat bran to the ration daily.
- ▶ Do not overfeed sows immediately before or after farrowing.
- ▶ Provide dry, warm farrowing pens in houses that are well ventilated and free from drafts.
- ▶ Where sows and pigs are kept on a concrete or wood floor, throw a chunk of uncontaminated sod in the pen once a week to prevent anemia. Soil contains enough iron to prevent this difficulty.
- ▶ It is helpful to earmark litters for identification in the selection of future breeding stock and for segregation in case disease makes the isolation of a litter necessary.
- ▶ Creep-feed suckling pigs to reduce injuries and death losses.
- ▶ Keep sows, gilts, and pigs free from lice and other external parasites to promote better health of the animals and prevent spread of disease.
- ▶ Boars and gilts should be at least eight months of age and well developed before being used for breeding purposes.
- ▶ Self-feeders save labor.
- ▶ Be careful in purchasing bred gilts or sows with litters in the usual community sales barns, and the hauling of sows and litters or feed in disease-contaminated trucks.