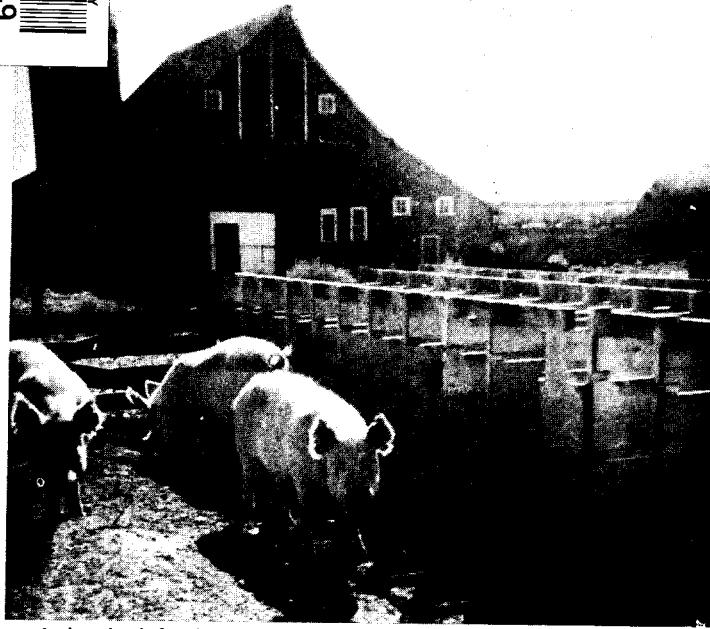


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NORTH DAKOTA STATE UNIVERSITY

# Gestation and Lactation Rations for Swine



Individual feeding stalls should be sturdily built and just wide enough to permit the larger gilts or sows to enter. Flooring will be beneficial if sows are fed outdoors.

LaDon J. Johnson, Assistant Animal Husbandman  
William E. Dinusson, Professor of Animal Science  
Clayton N. Haugse, Assistant Professor of Animal Science  
John N. Johnson, Assistant Professor of Animal Science  
Melvin A. Kirkeide, Associate Animal Husbandman

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**EXTENSION SERVICE**  
NORTH DAKOTA STATE UNIVERSITY  
FARGO, NORTH DAKOTA 58102

## GESTATION AND LACTATION RATIONS FOR SWINE

**P**ROFITABLE SWINE PRODUCTION depends on several things. One of the most important is to wean at least eight or more pigs per sow. Another important factor for producing and saving the largest number of pigs is proper nutrition of the sow before breeding, and during pregnancy and lactation. Proper sanitation, management and breeding are also important.

About 30 per cent of all pigs farrowed never reach market. This results in an average litter size per sow of only 7 1/3 pigs in North Dakota. Seventy per cent of the baby pig death losses occur the first week after farrowing. Another 30 per cent die before birth, mainly in the first 40 days of pregnancy.

Poor nutrition of the pregnant sow results in pigs that are weak or stillborn. Many pigs die when the sow lays on them because they do not have enough "pep" to get out of her way. Such losses are likely to be greater in pigs from poorly-fed sows.

### PASTURE

Alfalfa is one of the best pastures for hogs in North Dakota. Oats, rape, sudan grass and other temporary pastures can be used to good advantage. Rape pasture can cause photosensitization, a skin disturbance, in white-skinned hogs. You can best use pasture for the breeding herd and in growing out replacement gilts and boars, but you must rotate pastures to help control parasites and disease.

You can greatly reduce total feed fed during gestation if you put the sows on excellent pasture, such as alfalfa kept young and growing. Timely clipping will keep alfalfa lush and nutritious for

sows. However, even on excellent pasture it will be profitable to feed at least 2½ pounds per head of a balanced gestation ration.

### ALFALFA

Alfalfa is good to feed in gestation rations because it provides bulk and many essential vitamins and minerals, as well as protein and perhaps unknown factors. A minimum of 15 per cent ground alfalfa is recommended in gestation rations to be self-fed to gilts. How much alfalfa to feed depends on their condition; up to 40% of the ration may be fed to very fleshy gilts. For sows, feed 25 to 50 per cent or more alfalfa in a self-fed gestation ration. Hand feeding a mixed ration without alfalfa, plus free access to alfalfa hay in a rack may often be more practical than grinding and mixing alfalfa into a gestation ration. Leave the alfalfa out if the sows are on pasture. If alfalfa is not available, feed other clean hays and straws instead.

### ENERGY SOURCES

Most cereal grains can be used to provide the energy requirements of gestation and lactation. Do not use moldy, blighted, or ergot infected grains. Too much energy can make sows fat and clumsy, increase gestation feed costs, and lower the number of pigs born alive.

Barley, corn, and wheat are excellent energy sources. Millet or proso should also work well, but need extra protein or lysine supplementation. Oats are bulky and should form less than half the grain in a lactation ration.

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## PROTEIN NEEDS

Gestation and lactation rations should contain 14 to 16 per cent protein. These levels can be two units less (12 to 14 per cent) when sows are on green, high-quality pasture or if they are self-fed bulky rations during gestation. The exact amino acid requirements of sows for successful reproduction are not so well understood as the needs for growing pigs. Undoubtedly, quality of protein (level and balance of amino acids) is more important than the actual amount of protein. Protein sources such as soybean oil meal, meat scraps, tankage, fishmeal, milk or any of its by-products, are all effective supplements to make up the amino acid deficiencies of grains. Combinations of two or more of these protein supplements should be better than one alone.

When the total feed intake of a pregnant sow is limited to less than five pounds daily, it will be necessary that the gestation ration contain somewhat higher levels of protein than for gestation rations that are self-fed, or fed in larger quantities.

## VITAMINS

Cereal grains do not provide enough of certain vitamins that swine need for best reproduction and performance. However, sows and gilts on good quality pasture will usually get enough of the vitamins they need. Dry lot rations will often be short of some vitamins unless they are added to the feed. Lack of vitamins A and D can be critical in lactation rations. Alfalfa and yellow corn are about the only feeds that can furnish carotene, the precursor of vitamin A, and even these are not always dependable sources. The problem is more serious with vitamin D, since sun-cured roughages are the only feeds that contain any appreciable amounts and these usually do not furnish enough, particularly for lactation.

Some of the B-complex vitamins are often lacking. It is good insurance to add a commercial vitamin supplement to supply riboflavin, pantothenic acid, niacin, vitamin B<sub>12</sub>, and sometimes choline. Commercial sow supplements usually contain added vitamins at levels high enough to meet the sow's needs if fed according to the manufacturer's directions. Good quality alfalfa hay is also a source of B-complex vitamins, but if hay is stored for as much as 90 days, even excellent quality alfalfa is not a dependable source.

## MINERALS

Minerals that need special attention in sow rations are salt and calcium. No feeds commonly fed to sows contain enough of these minerals. Use iodized or trace mineral salt to prevent the farrowing of hairless pigs. Additional phosphorus should also be provided since not all of the phosphorus in grains,

especially oats, is available to swine. Supply calcium by feeding limestone at the rate of 1/2 per cent or more of the ration.

A 40-40-20 mixture of bonemeal, limestone, and trace mineral salt is a good mineral mix to feed free choice. Dicalcium phosphate can be used in place of bonemeal if more economical. Commercial mixes can be used, but do not feed high phosphorus beef cattle range minerals in swine rations because such mixtures do not contain enough calcium.

## SILAGE FOR GESTATION RATINGS

Pasture should be available for gestating sows in summer. Experience with feeding silage to gestating sows over winter in North Dakota has not been satisfactory, because they will not eat enough wet, cold silage in the low winter temperatures. Even with a special silage supplement, sows fed silage may do poorly because they will not eat enough dry matter.

## WATER

Producers too often overlook a good, clean source of water. Water is the cheapest nutrient, and good swine management means water available at all times. Keep water free of ice for winter feeding.

## CONFINEMENT OF SOWS

It is now possible to get successful reproduction from sows kept in continuous confinement during gestation and between lactations, so long as they get all the nutrients they need. However, feet and leg soundness may become a problem for sows kept on concrete or slatted floors for several gestations.

## FLUSHING

Flushing is the practice of having sows or gilts gaining in weight before and during the breeding season by feeding extra amounts of a high quality ration for 10 days before breeding and through the breeding season.

Thin sows and small gilts benefit more from flushing than thrifty sows in good condition. Flushing may result in higher ovulation rate and a higher rate of conception. Well-grown gilts that are older, larger, and have had at least two heat periods can be expected to conceive larger litters. Sows release from 10 to 20 ova per heat period, with an average near 17. Normally, at least 95 per cent of all ova released are fertilized. Since 1/3 of the pigs conceived may die before birth, it is advantageous to have as many pigs conceived as possible.

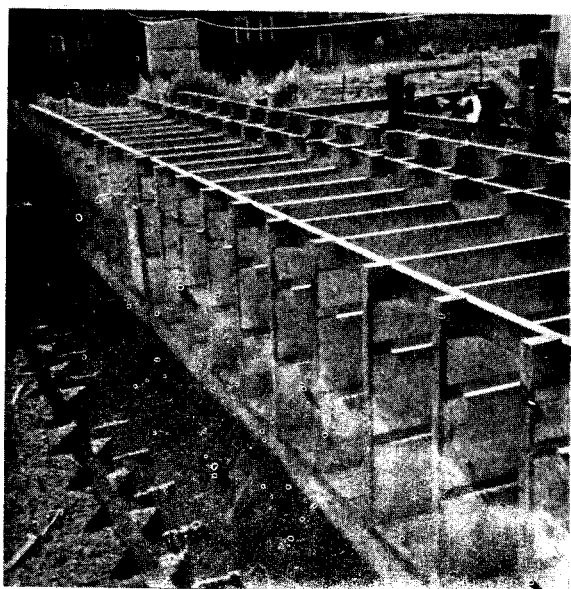


TABLE 1  
RECOMMENDED DAILY NUTRIENT ALLOWANCES FOR GESTATION  
AND LACTATION IN DRYLOT<sup>1/</sup>

		Gestation	Lactation	
		Gilts and Sows	Gilts	Sows
Total Digestible Nutrients, Lb. <sup>2/</sup>		3.2	8.23 <sup>3/</sup>	9.43 <sup>3/</sup>
Digestible Energy, KCals. <sup>2/</sup>		6,400	16,400 <sup>3/</sup>	18,800 <sup>3/</sup>
Crude Protein, Lb.		0.70	1.65	1.65
Inorganic Nutrients:				
Calcium	Grams <sup>4/</sup>	15	30	34
Phosphorus	Grams <sup>4/</sup>	10	20	23
Vitamins: <sup>5/ 6/</sup>				
Carotene	milligrams	16.5	33	37.5
Vitamin A**	Internat'l Units	8,250	16,500	18,700
Vitamin D**	I.U.'s	550	1,100	1,250
Riboflavin	mg.**	8.2	16.5	18.8
Niacin	mg.**	44	88	100
Pantothenic Acid	mg.**	33	66	75
Vitamin B <sub>12</sub>	mcg.**	45	110	125
Approximate total air-dry feed:		4 <sup>1/4</sup>	11.0	12.5

<sup>1/</sup>Based on National Research Council requirements for breeding swine and adjusted by recent research and farm experience.

<sup>2/</sup>Winter gestation rations will have to be increased by about 1/2-pound of feed daily if sow is not housed in a warm building.

<sup>3/</sup>It is assumed that the lactation ration is fed according to sow's appetite after six days, unless litter consists of less than six pigs, in which case feed intake of sow should be restricted. Sows are assumed to milk proportionately more than gilts.

<sup>4/</sup>Mineral requirements suggested above are minimums. Amounts in reasonable excess of these daily allowances would not be dangerous. Increasing either calcium or phosphorus greatly could upset utilization of the other, as well as have adverse affects on absorption and utilization of certain trace elements.

<sup>5/</sup>Vitamins starved are likely to be deficient in drylot sow rations. These should be added to insure ration adequacy.

<sup>6/</sup>Choline is required. Requirements are not known.

TABLE 2  
SUGGESTED HAND-FED GESTATION RATIIONS (1 ton mix)  
For Feeding at Rate of Four or Five Pounds Per Day  
With Alfalfa Fed Free Choice  
(16% Protein)

Protein Supplement Used	Ration Type	Corn or Millet	Barley Oats, or Wheat, Durum	Protein Supplement Pounds
32%	1	None	1,600	400
32%	2	up to 400	1,140	460
32%	3	up to 800	680	520
32%	4	up to 1200	220	580
35%	1	None	1,650	350
35%	2	up to 400	1,200	400
35%	3	up to 800	750	450
35%	4	up to 1200	295	505
38%	1	None	1,690	310
38%	2	up to 400	1,250	350
38%	3	up to 800	800	400
38%	4	up to 1200	355	445

Proso (millet) contains 12% protein, but its protein is poor quality. Additional protein needs to be fed in rations containing proso to offset the lysine deficiency. These suggested rations are calculated on the basis that proso requires as much supplementation as corn, which contains 9% protein. Wheat protein is of somewhat poorer quality than that in barley and oats. Hence, as much supplemental protein must be fed with wheat or durum as with barley and oats.

**TABLE 3**  
**SUGGESTED MINIMUM ALLOWANCES IN FORMULATING RATIONS**

	GESTATION		LACTATION	
	Hand Fed	Bulky Ration, Full Fed	(Full Fed)	
			Gilts	Sows
Crude Protein				
Per Cent	16	14.5	15	14.5
Pounds per ton	320	290	300	290
Calcium				
Per Cent	1.0	0.6	0.65	0.65
Pounds per ton	20	12	13	13
Phosphorus				
Per Cent	0.8	0.45	0.5	0.5
Pounds per ton	16	9	10	10
Salt				
Per Cent	0.5	0.5	0.5	0.5
Pounds per ton	10	10	10	10
Total Digestible Nutrients				
Per Cent	66 to 75	53 to 68	75 or higher	75 or higher
	Range	Range		
Vitamin A				
Per pound	3,500 IU	2,000 IU	2,000 IU	2,000 IU
Per ton of Ration	7 Million IU	4 Million IU	4 Million IU	4 Million IU
Vitamin D				
Per pound	350 IU	200 IU	200 IU	200 IU
Per ton of Ration	700,000 IU	400,000 IU	400,000 IU	400,000 IU
Riboflavin				
Per pound	3.3 mg	1.5 mg	1.5 mg	1.5 mg
Per ton of Ration	6.6 gms	3,000 mg (3 gm)	3,000 mg	3,000 mg
Niacin				
Per pound	17 mg	10 mg	10 mg	10 mg
Per ton of Ration	34 gms	20,000 mg (20 g)	20,000 mg	20,000 mg
Pantothenic Acid				
Per pound	12 mg	6 mg	6 mg	6 mg
Per ton of Ration	24 g	12,000 mg (12 g)	12,000 mg	12,000 mg
B <sub>12</sub>				
Per pound	10 mcg	5 mcg	5 mcg	5 mcg
Per ton of Ration	20 mg	10 mg	10 mg	10 mg

**TABLE 4 SUGGESTED LACTATION RATIONS (1 ton mix)\* ( Formulated to contain 15 per cent protein)**

Protein Supplement Used	Ration Type	Barley, Oats, Wheat, or Durum	Corn or Millet	Pounds Protein Supplement
32%	1	1700	---	300
32%	2	1240 or more	up to 400	360
32%	3	780 or more	up to 800	420
32%	4	320 or more	up to 1200	480
35%	1	1740	---	260
35%	2	1290 or more	up to 400	310
35%	3	835 or more	up to 800	365
35%	4	385 or more	up to 1200	415
38%	1	1770	---	230
38%	2	1325 or more	up to 400	275
38%	3	875 or more	up to 800	325
38%	4	430 or more	up to 1200	370

\*For feeding lactating gilts and sows according to appetite, unless litter is smaller than six pigs. Sows nursing litters of five or fewer pigs need not be full fed.

If all lactating females in herd are sows rather than gilts, amount of protein supplement used per ton of ration can be reduced slightly. Barley, oats, wheat, or durum can be substituted for supplement at rates of 50, 45, or 40 pounds supplement per ton for rations containing supplements of 32%, 35%, or 38% protein content, respectively. This will give rations calculated to contain at least 14.5 per cent total protein. If part of the lactating females are gilts, formulas indicated in Table 4 should be followed.

If amount of supplement is reduced as suggested for a sow herd, it will be necessary to increase the calcium and phosphorus allowances. This can be accomplished by adding at least 10 pounds per ton ( $\frac{1}{2}$  per cent of formula) of a mineral source supplying at least 26% calcium and 13% phosphorus. Steamed bonemeal or dicalcium phosphate are very satisfactory.

When lactation rations similar to Type 1 (minimum of supplement) are used, it will be necessary to increase the calcium and phosphorus content of the ration slightly, unless the commercial supplement used furnishes more calcium and phosphorus than the minimum levels specified in Table 5. This can be accomplished by adding at least five pounds per ton ( $\frac{1}{4}$  per cent of ration) of dicalcium phosphate or steamed bone meal.

## COMPLETE GESTATION AND LACTATION RATIIONS

Completely balanced, commercial pelleted gestation and lactation rations are available at competitive prices. These rations are specially formulated to furnish the necessary nutrients when fed according to directions. Do not dilute such rations with ground grains. Feed manufacturers often recommend restricted individual feeding of gestating sows plus free access to excellent alfalfa hay.

Pelleting the gestation ration will be of less benefit when you restrict feeding than for growing-

fattening pigs. If the ration contains much fibrous feed, pelleting the lactation ration will permit a sow or gilt nursing a large litter to eat more feed and thus more milk-producing nutrients than with the same ration in meal form. Pelleted rations offer certain other advantages of less bulk, freedom from dust and waste, and easy handling.

To make a balanced ration using the suggestions in Table 2 (Gestation Rations) and Table 4 (Lactation Rations), the protein supplement should furnish the nutrients in Table 5 in equal or greater amounts than suggested.

## METHOD OF FEEDING GESTATION RATIIONS

Limiting the energy intake, or limited feeding, is rapidly gaining popularity and is recommended for pregnant sows. But even though you limit the energy intake of the pregnant sow, it is important that she get all the protein, vitamins, and minerals that she needs. Table 3 shows that protein, vitamin and mineral levels should be slightly higher in rations for limited feeding than in bulky rations designed for self-feeding.

Main advantages of limited feeding of gestation rations:

1. Reduces feed inputs and gestation feed costs.
2. Keeps sow leaner so she is less clumsy at farrowing, less likely to crush newborn pigs.
3. Reduces embryonic mortality of pigs; may give one more pig per litter at birth.

Three methods of limited feeding can be used:

1. Hand-feeding sows in individual stalls. This gives the herdsman a chance to feed each sow according to her condition and size. Sows have successfully been tied or tethered in stalls for individual feeding.

TABLE 5. PROTEIN SUPPLEMENTS

Protein in Supple- ment	Calcium	Phosphorus	Vitamin A	Vitamin D	Riboflavin	Niacin	Pantothenic Acid	Choline	B <sub>12</sub>
Per Cent	%	%	IU/LB	IU/LB	MG/LB	MG/LB	MG/LB	MG/LB	MCG/LB
32	4*	2*	16,000	1,600	3.6	13	10	640	40
35	4.5*	2.2*	18,000	1,800	4.0	15	11.25	720	45
38	5.0*	2.5*	20,000	2,000	4.5	17	12.5	800	50

\*If the supplements do not contain these amounts of calcium and phosphorus, add limestone or bonemeal or dicalcium phosphate to make up the requirement.

2. Self-feeding a bulky ration. Rations made bulky by including considerable high-quality alfalfa, oats, or other fibrous feeds contain lower energy concentrations per pound. Sows with large appetites may tend to eat more than they need. Also, grinding and mixing a bulky product such as alfalfa may be difficult on many farms. This method involves least labor. Sows reach their "fill" on this type ration before they have taken in as much energy as on more concentrated rations.
3. A third method being used successfully by some Corn Belt producers is to allow the sows access to a gestation ration of grain plus needed supplement in a self-feeder for only 12 hours of every 72, or eight hours of every 48. You can give sows free access to high-quality alfalfa in a rack when they can't get to the self feeder. This method involves no hand feeding and avoids grinding and mixing alfalfa or similar bulky feeds. Hungry sows can become a social problem.

Adequate self-feeder space would be absolutely necessary to use this method. This method of limit feeding has not been used in North Dakota so far, and does not seem advisable during winter in this state except with heated housing.

A fourth method in common use is somewhat less desirable: sows are fed a restricted amount of ration in a trough and they may be allowed access to alfalfa in a rack. This method is less desirable because "boss" sows will tend to eat the allowance meant for the more timid ones.

Regardless of method used, it is desirable to restrict the energy intake of pregnant sows and gilts, at least during the first two-thirds, or 80 days, of gestation.

The unborn pig makes about two-thirds of its growth in the last 40 days of gestation. Successful reproduction has been obtained by feeding gilts about 4½ pounds daily up to farrowing. However, very thin gilts and sows may need as much as 50 per cent more feed during the last five to six weeks to provide added nutrients for the rapidly developing unborn pigs.

## FEEDING DURING FARROWING

Many swine producers reduce the sow's feed intake shortly before farrowing and replace part of the ration with wheat bran or linseed meal to keep the sow's digestive tract in good condition. Many swine herdsmen provide only water but no feed the day before and the day after farrowing. If the sow

is unusually restless, a double-handful of the gestation ration mixed with bran or linseed oil meal is a good feed the day before and/or the day after farrowing. Over-feeding may result in too heavy milk flow before the pigs can use it. This can result in "caked udders" and sick sows. Start sows on a lactation ration slowly and have them on full feed at five to six days after farrowing.

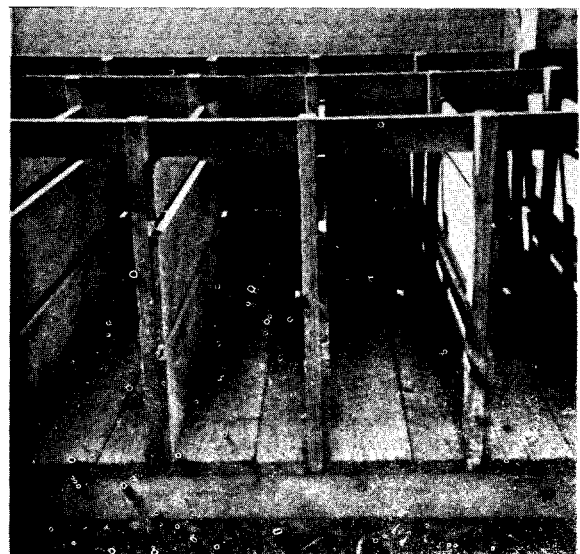
## FORMULATING BULKY RATIONS FOR SELF-FEEDING DURING GESTATION

If you want to use any of the above rations for self-feeding to sows, you should add alfalfa. Combine 400 to 700 pounds ground high-quality alfalfa with the above formulas to make one ton of bulky ration for self-feeding to gilts. For older sows that have completed their growth, use about 750 pounds of alfalfa or more with enough of the above formulas to make one ton of mixed, bulky ration.

## PLANNING SOW FEEDING STALLS

The "Swine Equipment Plans and Housing Needs" booklet has suggested plans for building individual sow stalls as well as farrowing crates and other equipment needed in the hog operation. You can get this plan book from your County Agent or from the Extension Agricultural Engineer, North Dakota State University, Fargo, North Dakota 58102.

Sow feeding stalls should preferably be built in five or six stall units. Such units will provide rigidity and still be movable. Center-to-center widths of stalls should be about 20 inches for gilts, and at least six feet long. Longer stalls up to eight feet in length may help discourage more aggressive sows from forcing timid sows out of a stall. Partition the feed trough solidly so that sows cannot rob feed from each other.



Sow feeding stalls

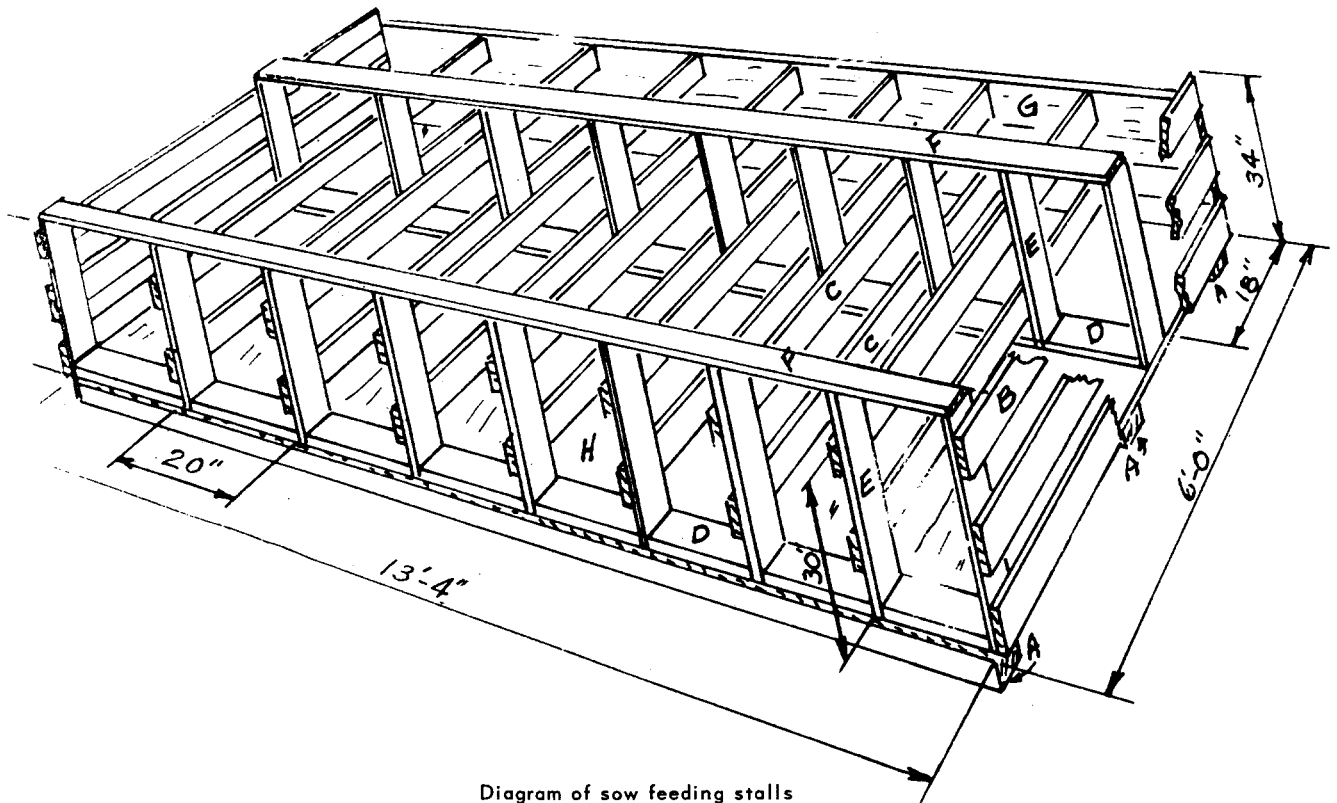


Diagram of sow feeding stalls



