

AGRICULTURAL EXPERIMENT STATION

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Rations for Livestock and Poultry

The College of Agriculture through its various departments is asked from time to time to recommend rations for various types of livestock and poultry. It has seemed desirable to assemble these in one publication. Specific recommendations for rations for dairy cattle, beef cattle, swine, sheep, and poultry are presented.

Not all the ingredients suggested are available at all times and places and at attractive prices; hence substitutions may be advisable or necessary. When such is the case the substitutions should be made on the basis of similarity of ingredients with respect to physical character, composition, digestibility and specific effects.

RATIONS FOR DAIRY CATTLE

A. C. RAGSDALE

Grain mixes suitable for feeding dairy animals with various classes or kinds of roughages are presented as guides in selecting and mixing desirable and efficient balanced rations. Each mix suggested is balanced to be fed with the roughages under which it is listed. The crude protein, digestible protein and total digestible nutrients are based on Morrison's feeding tables and are approximate. Substitutions may be made when the costs of available feeds make modifications more economical. While such changes may slightly affect the composition, physical character and desirability of the ration, the results will be satisfactory when good judgment is used in making such substitutions.

Among the more common feeds, for example, ground corn, barley and hominy feed are interchangeable and may be substituted one for the other. Ground wheat may replace as much as one-half of the corn, barley or hominy. Ground or rolled oats, wheat bran, wheat middlings, alfalfa or lespedeza meal, or dehydrated alfalfa or lespedeza are of somewhat similar feeding value and may be used in any combination or replace one another when consideration is given to slight variations in composition and the other ingredients of the ration. Linseed meal and finely ground lespedeza seed are of about the

same composition and may usually replace one another in the rations of dairy animals. Cottonseed meal, soybean meal, and corn gluten meal may be substituted one for the other in whole or in part. Likewise, when allowance is made for the slightly lower protein content, corn gluten feed, brewers' dried grains, linseed meal, or finely ground lespedeza seed may be substituted for any of these high protein concentrates. Molasses and dried molasses beet pulp add palatability and may be included to advantage in the rations of milking or dry cows when proper consideration is given to composition and cost.

TABLE 1: GRAIN MIXES CONTAINING APPROXIMATELY 14-16 PER CENT
CRUDE PROTEIN

To be fed when the roughage ration consists of about *equal or equivalent* portions of legume hays such as alfalfa, lespedeza, soybean or clovers and non-legume roughages such as timothy, prairie or sudan grass hay, corn or sorghum silages or fodders, grass silage or root crops. The mixes are also suitable for feeding on good pasture.

	<i>pounds</i>		<i>pounds</i>
Corn and cob meal	800	Ground corn or hominy feed	600
Ground oats	400	Ground barley or wheat	400
Wheat bran	500	Ground oats	400
Cottonseed or soybean meal (41%)	250	Wheat bran	300
Steamed bone meal	25	Cottonseed or soybean meal (41%)	250
Salt	25	Steamed bone meal	25
	<hr/>	Salt	25
Total	2000	Total	2000
Crude protein	14.8%	Crude protein	15.5%
Digestible protein	11.8%	Digestible protein	12.4%
Total dig. nutrients	71.2%	Total dig. nutrients	74.9%
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	<i>pounds</i>		<i>pounds</i>
Ground corn or hominy feed	450	Ground corn or hominy feed	400
Ground barley or wheat	400	Ground barley or wheat	400
Ground oats	400	Ground oats	300
Wheat bran	200	Wheat bran	300
Wheat middlings or shorts	200	Corn gluten feed (23%)	300
Soybean meal (41%)	150	Linseed meal (34%) or finely	
Cottonseed meal (41%)	150	ground lespedeza seed	150
Steamed bone meal	25	Cottonseed meal (41%)	100
Salt	25	Steamed bone meal	25
	<hr/>	Salt	25
Total	2000	Total	2000
Crude protein	16.7%	Crude protein	16.9%
Digestible protein	13.5%	Digestible protein	13.9%
Total dig. nutrients	75.6%	Total dig. nutrients	75.0%

TABLE 2: GRAIN MIXES CONTAINING APPROXIMATELY 20 PER CENT
CRUDE PROTEIN

To be fed when the roughage ration consists of non-legumes such as timothy, prairie, sudan grass or oat hay, corn or sorghum silages or fodders, grass silage or root crops. These mixes are also suitable for feeding when legumes make up less than one-third of the roughage ration, or for feeding on fair or mature pasture.

	<i>pounds</i>		<i>pounds</i>
Ground corn or hominy feed	350	Ground corn or hominy feed	300
Ground barley or wheat	300	Ground barley or wheat	250
Ground oats	400	Ground oats	300
Wheat bran	300	Wheat bran	300
Soybean meal (41%)	400	Corn gluten feed (23%)	300
Cottonseed meal (41%)	200	Linseed meal (34%) or finely ground lespedeza seed	200
Steamed bone meal	25	Cottonseed meal (41%)	300
Salt	25	Steamed bone meal	25
	<hr/>	Salt	25
Total	2000	Total	2000
Crude protein	20.8%	Crude protein	20.5%
Digestible protein	17.0%	Digestible protein	16.9%
Total dig. nutrients	74.8%	Total dig. nutrients	74.1%
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	<i>pounds</i>		<i>pounds</i>
Ground corn or hominy feed	300	Ground corn or hominy feed	400
Ground barley or wheat	300	Ground barley or wheat	300
Ground oats	300	Ground oats	250
Wheat bran	300	Wheat bran	250
Wheat middlings or shorts	200	Alfalfa or lespedeza meal	150
Soybean meal (41%)	300	Soybean meal (41%)	300
Cottonseed meal (41%)	250	Cottonseed meal (41%)	300
Steamed bone meal	25	Steamed bone meal	25
Salt	25	Salt	25
	<hr/>		<hr/>
Total	2000	Total	2000
Crude protein	20.7%	Crude protein	21.0%
Digestible protein	16.9%	Digestible protein	16.9%
Total dig. nutrients	75.0%	Total dig. nutrients	73.4%

TABLE 3: GRAIN MIXES CONTAINING APPROXIMATELY 32-34 PER CENT CRUDE PROTEIN

These mixes of which the following are typical may be purchased by the dairyman with an abundance of home grains such as corn, barley, wheat or oats. This high protein feed should be mixed with the home grains in the proportion of one part of the high protein supplement to two parts of home grains to give a 16 per cent crude protein mix or use equal parts to obtain a 20 per cent crude protein mix when the type of roughage available justifies feeding grain mixes of these protein contents as has been suggested in the preceding tables.

	<i>pounds</i>		<i>pounds</i>
Corn gluten meal (41%)	350	Corn gluten feed (23%)	300
Cottonseed meal (41%)	500	Cottonseed meal (41%)	500
Linseed meal (34%) or finely ground lespedeza seed	200	Linseed meal (34%) or finely ground lespedeza seed	200
Soybean meal (41%)	500	Soybean meal (41%)	500
*Alfalfa or Lespedeza meal	200	Peanut meal (Solvent Proc.)	200
*Molasses	150	Alfalfa meal	200
Steamed bone meal	50	Steamed bone meal	50
Salt	50	Salt	50
	<hr/>		<hr/>
Total	2000	Total	2000
Crude protein	33.3%	Crude protein	34.4%
Digestible protein	27.3%	Digestible protein	28.6%
Total dig. nutrients	69.7%	Total dig. nutrients	69.8%

*When molasses is not available, add 150 lbs. of dried molasses beet pulp, or replace the alfalfa or lespedeza meal and molasses with an equal weight (350 lbs.) of alfalfa molasses feed.

TABLE 4: DRY COW RATIONS

The dry cow should be fed liberally (3 to 10 pounds) of a slightly laxative grain mix. The roughage ration of the dry cow when not on good pasture, should preferably consist of good quality legume hay and silage, root crops or soaked dried molasses beet pulp.

	<i>pounds</i>		<i>pounds</i>
Ground corn, barley or hominy..	550	Ground corn, barley or hominy..	450
Ground oats	550	Ground oats	450
Wheat bran	550	Wheat bran	250
Soybean meal (41%)	150	*Alfalfa or lespedeza meal	225
Linseed meal (34%) or finely		*Molasses	125
ground lespedeza seed	150	Soybean meal (41%)	200
Steamed bone meal	25	Linseed meal (34%) or finely	
Salt	25	ground lespedeza seed	200
		Steamed bone meal	50
		Salt	50
Total	2000	Total	2000
Crude protein	16.3%	Crude protein	16.4%
Digestible protein	13.3%	Digestible protein	13.3%
Total dig. nutrients	73.3%	Total dig. nutrients	68.4%

*When molasses is not available, reduce the alfalfa or lespedeza meal to 200 lbs. and add 150 lbs. of dried molasses beet pulp, or replace the alfalfa or lespedeza meal and molasses with an equal weight (350 lbs.) of alfalfa molasses feed.

TABLE 5: BULLS AND HEIFERS OVER ONE YEAR

Leafy, early cut legume or mixed hays of high quality are most desirable for feeding bulls. The usual rate of feeding hay is one to one and one-half pounds per 100 pounds live weight. Pasture or soiling crops in moderate amounts are very desirable. Silage is not considered desirable by most feeders, but limited to 10 to 15 pounds per day may be used satisfactorily. Soaked dried molasses beet pulp in about the same amounts as suggested for silage is preferred, especially for older bulls. The grain allowance to be fed varies from 4 to 10 pounds, depending on the size and condition of the bull and the roughage allowance.

The general aim in feeding the bull is to keep him in a strong vigorous condition. Avoid feeding too much roughage which may tend to cause paunchiness, and too much grain which may result in getting the bull too fat. Suitable grain mixes are listed below.

	<i>pounds</i>		<i>pounds</i>
Ground or rolled oats	480	Ground or rolled oats	340
Ground corn or barley	200	Ground corn or barley	340
Wheat bran	200	Wheat bran	200
Linseed meal	100	Soybean meal	100
Steamed bone meal	10	Steamed bone meal	10
Salt	10	Salt	10
Total	1000	Total	1000
Crude protein	14.5%	Crude protein	15.0%
Digestible protein	11.8%	Digestible protein	12.1%
Total dig. nutrients	72.5%	Total dig. nutrients	74.2%

TABLE 6: CALF STARTER AND GRAIN MIX FOR CALVES AND HEIFERS UNDER ONE YEAR

The *calf starter* should be fed to calves reared on the limited whole milk plan until they are approximately 14 to 16 weeks of age, when they should be changed to the grain mixture recommended for skim-milk calves and older heifers. The grain mix for skimmilk calves and heifers is customarily fed young calves reared on the skimmilk plan just as soon as they will begin to eat grain, usually at 10 days to two weeks of age, and thereafter until at least the approximate age of one year. Many good calf feeders also like to feed the starter to calves up to the approximate age of 60 days when the skimmilk plan is used and thereafter substitute the grain mix for skimmilk calves and older heifers.

<i>Calf starter</i>	<i>pounds</i>	<i>Grain mix for calves on skimmilk or older heifers</i>	<i>pounds</i>
Ground yellow corn	300	Ground yellow corn	380
Ground oats	300	Ground or rolled oats	300
Wheat bran	100	Wheat bran	200
Linseed meal (34%)	100	Soybean meal (41%)	50
Ground alfalfa (choice leafy green)	50	Linseed meal (34%)	50
Soybean meal (41%)	50	Salt	10
Dried feeding skimmilk	50	Steamed bone meal	10
Soluble blood flour	27.5		
Steamed bone meal	10	Total	1000
Salt	10	Crude protein	14.3%
Reinforced cod liver oil	2.5	Digestible protein	11.5%
		Total dig. nutrients	74.1%
Total	1000		
Crude protein	18.6%		
Digestible protein	15.7%		
Total dig. nutrients	73.8%		

RATIONS FOR BEEF CATTLE

L. A. WEAVER

Self-feeding a mineral mixture composed of equal parts by weight of finely ground limestone, steamed bonemeal and salt will supply the minerals that are usually needed with each of the rations for beef cattle.

Fattening Rations

Satisfactory grain rations for calves or yearlings being full fed while on pasture or being fed a legume hay in dry lot:

Parts by Weight

Ration I	{	<p>100 parts shelled or cracked corn (ground barley, ground wheat or ground grain sorghum may be substituted for at least ½ of the corn).</p> <p>10 parts soybean, cottonseed or linseed oilmeal or mixture of the three.</p>
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	<i>Parts by Weight</i>	
Ration II	}	75 parts shelled or cracked corn.
		50 parts coarsely ground oats.
		25 parts alfalfa meal or wheat bran.
		15 parts soybean, cottonseed or linseed oilmeal or mixture of the three.
	<i>Parts by Weight</i>	
Ration III	}	600 parts shelled or cracked corn.
		20 parts reground oat feed.
		20 parts cottonseed or soybean oilmeal (41-43% protein).
		30 parts alfalfa meal.
		30 parts blackstrap molasses.

Grain Ration for Beef Cows Nursing Winter Calves

When cows are fed corn or sorghum silage or corn or sorghum fodder and some legume hay or when being fed a good mixed clover and grass hay, the following grain ration will prove satisfactory.

65 parts ground corn.
 65 parts ground oats.
 25 parts wheat bran.
 25 parts soybean, cottonseed or linseed oil meal.

PRACTICAL SWINE RATIONS

1. Supply pasture or green leafy legume hay—(may not be required by fattening hogs weighing 100 pounds or more).
2. Self feed simple mineral mixture such as equal parts finely ground limestone, bonemeal, and salt.
3. Use corn (or similar grain when price relationships warrant) to furnish energy producing (fattening) nutrients.
4. Supplement carbonaceous grains with a protein supplement, at least 25% of which is of animal origin. Examples of efficient and economical supplements for feeding on pasture and in dry lot:

Supplement A (Pasture).—Three parts of either soybean, linseed, or cottonseed meal, or a combination of these and one part tankage or meat scraps.

Supplement B (Dry Lot).—Two parts of either soybean, linseed, or cottonseed meal, or a combination of these and one part tankage or meat scraps and one part of alfalfa meal (or any green leafy legume hay).

Half as much supplement is needed when hogs are on good pasture or when wheat, rye, barley or oats are used instead of corn.

5. In general, use feeds with minimum fiber content (bulk) for small pigs and fattening hogs. While breeding hogs require more concentrated feeds than cattle, sheep or horses, they can use more bulky feeds than pigs or fattening swine.

6. Sows should be gaining in weight when bred. Bred sows should be fed so as to gain $\frac{3}{4}$ to 1 pound per head per day during gestation period. Growing-fattening pigs and sows suckling pigs should be full fed.

Suggested Rations

On Pasture:

Bred Sows—Feed approximately 4 pounds of supplement A with each bushel of corn, or about $\frac{1}{3}$ pound of supplement A per head per day with corn needed to keep sow in desired condition.

Sows and Suckling Pigs—Feed 6 pounds supplement A with each bushel of corn—(full feed).

Weanling Pigs (under 75 lbs.)—Self feed corn and supplement A free choice or feed 10 pounds of supplement per bushel of corn.

Growing-Fattening Hogs (75-150 lbs.)—Self feed corn and supplement A free choice or feed 7 pounds of supplement per bushel of corn.

Growing-Fattening Hogs (150 lbs. & up)—Self feed corn and supplement A free choice, or feed 5 pounds of supplement per bushel of corn.

In Dry Lot:

Bred Sows—Feed 6 pounds of supplement B with each bushel of corn, or $\frac{1}{2}$ or $\frac{2}{3}$ pounds of supplement per head per day with corn needed to secure desired conditions.

Sows and Suckling Pigs—Feed 8 pounds supplement B with each bushel of corn (full feed).

Weanling Pigs (under 75 lbs.)—Self feed corn and supplement B free choice, or feed 18 pounds of supplement B per bushel of corn.

Growing-Fattening Hogs (75-150 lbs.)—Self feed corn and supplement B free choice or feed 12 pounds of supplement per bushel.

Growing-Fattening Hogs (150 lbs. & up)—Self feed corn and supplement A free choice, or feed 7 pounds of supplement per bushel of corn.

Note: In all cases where corn and supplement are self-fed free choice, if animals consume more supplement than desirable adding 100 pounds of a mixture of 10 parts ground limestone, 10 parts of bone meal, and 1 part of salt to each 500 pounds of supplement may be expected to reduce amount of supplement consumed.

RATIONS FOR SHEEP

Breeding Ewes

With each of the following rations a mineral mixture of equal parts by weight of ground limestone, steamed bone meal and salt should be fed.

Ewes that are in good condition in the fall, have sound mouths, and have access to good pasture and good legume hay usually stay in good condition, require no grain until 6 weeks before lambing.

With good legume hay, fed 3 to 4 pounds daily, the following grain mixtures give satisfactory results with healthy sheep.

By Weight and Parts

- 6 parts shelled corn.
- 3 parts oats or bran or a mixture of the two.
- 1 part, either soybean, cottonseed, or linseed meal or a mixture of the three.

If it is necessary to feed non-leguminous hay or corn stover feed it ad libitum. A grain mixture should be fed with it and the following gives satisfactory results with healthy sheep.

Until six weeks before lambing:

By Weight and Parts

- 4 parts shelled corn.
- 2 parts oats.
- 2 parts bran.

During the last six weeks of pregnancy feed:

By Weight and Parts

- 3 parts shelled corn.
- 3 parts oats.
- 1 part bran.
- 1 part either soybean, linseed or cottonseed meal or a mixture of the three.

With 2 to 3 lbs. of legume hay fed daily per head and carbonaceous roughage of various sorts ad libitum, the following grain mixture should give satisfactory results with healthy sheep.

By Weight and Parts

- 4 parts shelled corn.
- 2 parts oats.
- 1 part bran.
- 1 part soybean, linseed, or cottonseed meal or a mixture of the three.

Amounts of grain to feed at any time depend on condition of ewes. The daily necessary allowance per head is usually never over 2 pounds.

Feeder Lambs

Feeder lambs full fed in dry lot with mixed hay for their roughage should have all of it they will clean up and the following grain ration should be satisfactory.

By Weight and Parts

- 10 parts shelled corn.
- 1 part soybean, linseed, or cottonseed meal or a mixture of the three.

The grain mixture should usually not exceed the amount of hay fed.

Feeder lambs full fed in dry lot should have good quality legume hay ad libitum. A satisfactory grain ration is as follows:

By Weight and Parts

15 parts shelled corn.

1 part soybean, linseed, or cottonseed meal or a mixture of the three.

The grain mixture should usually not exceed 1½ pounds daily per head.

RATIONS FOR POULTRY

H. L. KEMPSTER

CHICK STARTER

	<i>pounds</i>
Yellow corn meal	45
Shorts	15
Bran	5
Alfalfa leaf meal	10
Meat scrap	7
Soybean oil meal	15
Salt	1
Cod liver oil*	1

GROWING MASH

	<i>pounds</i>
Yellow corn meal	100
Shorts	100
Bran	100
Meat scrap	30
Soybean oil meal	30
Alfalfa leaf meal	16
Salt	4

*Vitamin D Supplement—85 A O A C Units.

Vitamin D Supplements include sardine oil and livestock feeding oils containing irradiated sterol, can be used when cod liver can not be obtained or when these products are less expensive. Fortified oils containing 400 A O A C units of vitamin D per gram are usually cheaper per unit of vitamin D than the 85 A O A C potency oils—Dry mix Vitamin D supplements are also satisfactory—These products should all be used according to the manufacturing instructions.

Rations for Turkeys

		Starting Mash. First 10 Weeks. All-Mash*.		Growing and Finishing Mash. 10 Weeks to Maturity. Mash and Grain.		
Yellow corn meal	lbs.	210	210	100	100	100
Pulverized Barley or kafir	"	—	—	—	—	100
Bran or ground oats	"	75	50	70	70	50
Shorts or ground wheat	"	50	50	100	100	100
Alfalfa leaf meal	"	25	50	30	30	50
Meat Scrap (55%)	"	50	40	40	60	40
Soybean oil meal	"	50	45	30	—	30
Dried milk	"	25	—	20	20	20
Fish meal	"	—	40	—	—	—
Salt	"	5	5	4	4	4
Vitamin D Supplement*	"	5	5	—	—	—

*85 A O A C Units.

Laying Mash for Turkeys

	Laying Mash		
	1	2	3
Ground yellow corn	200 lbs.	200 lbs.	200 lbs.
Wheat bran	165 "	165 "	135 "
Alfalfa leaf meal	35 "	35 "	60 "
Shorts	200 "	165 "	175 "
Meat scrap	115 "	75 "	60 "
Soybean oil meal	—	75 "	60 "
Fish meal	—	—	60 "
Dried milk	35 "	35 "	—
Cod liver oil*	14 pts.	14 pts.	14 pts.
Salt	7 lbs.	7 lbs.	7 lbs.

*Vitamin D Supplement—85 A O A C Units.

Laying Mash for Chickens

SIX FORMULAS FOR LAYING MASH

	**		**		**	
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Yellow corn meal (lbs.)	200	200	200	200	200	200
Bran (lbs.)	200	135	165	165	165	50
Alfalfa leaf meal (lbs.) .....	...	70	35	35	35	...
Shorts (lbs.)	200	200*	200	195	200	...
Ground wheat (lbs.) .....	...	...	...	...	...	350
Meat scrap (lbs.)	150	75	150	75	115	150
Dried milk (lbs.) .....	...	...	...	...	35	...
Soybean oil meal .....	...	80	...	80	...	...
Salt (lbs.)	7	7	7	7	7	7
Fish oil (lbs.)***	7	7	7	7	7	7

*If high in bran content.

**Mash suggested for breeder ration.

***A vitamin D supplement as recommended in the above rations, applies to the period of winter months from October or November to April first. It is essential in breeder rations and normally desirable for flocks producing market eggs.

For 100 hens 3 to 4 gallons of milk daily will satisfy the protein requirements as a substitute for the 1½ pounds of meat scrap and other protein supplements. On the other hand, if only 2 gallons are available, it should be fed as a supplement to the mash.

Laying mashes usually contain from 18-20 per cent protein and under average conditions hens should consume at least one-half as much mash as grain although frequently the proportions are equal. Ground feed mixtures such as equal parts of corn, oats, wheat, and barley form a satisfactory base for a laying mash and can be substituted for the mill feeds in the above formulas. Coarsely ground grains are preferable to those ground extremely fine.

CONCENTRATES FOR LAYING HENS

Concentrates are sometimes used in combination with grains for poultry feeding. Concentrates usually contain 30 per cent or more protein whereas laying mashes contain 20 per cent.

FORMULAS FOR LAYING CONCENTRATES IN LBS.				
	No. 1	No. 2	No. 3	No. 4
Dried Buttermilk	100	...	...	...
Soybean Oil Meal	225	275	200	250
Meat Scrap	225	275	200	250
Fish Meal .....	...	...	100	...
Alfalfa Leaf Meal	100	200	150	100
Ground Oats .....	...	...	...	100
Wheat Shorts	230	130	180	200
Wheat Bran	100	100	50	100
Salt	20	20	20	20
*Fortified Oil	2.5	2.5	2.5	2.5

*400 A.O.A.C. D units.

Whole grains must be separately fed and supplied constantly in hoppers along with the concentrate. These grains should include yellow corn and a choice, depending upon cost and availability, of barley, wheat, oats, and grain sorghums.