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EC1463 Revised 1939 Poultry Feeds and Feeding

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Revised
1939

Nebraska
COOPERATIVE EXTENSION WORK
IN AGRICULTURE AND HOME ECONOMICS
U. of N. Agr. College & U. S. Dept. of Agr. Cooperating
W. H. Brokaw, Director, Lincoln

Extension
Circular
1463

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Review

POULTRY FEEDS AND FEEDING

Lincoln, Nebraska
January, 1939

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POULTRY FEEDS AND FEEDING

Efficient feeding of poultry, under our modern system of production and management, is necessary if the enterprise is to prove successful. By efficient feeding is meant supplying feeds which will maintain health, growth and production and at the same time be available at prices justifying their use. Efficient feeding also applies to methods as well as feeds. As the number of birds in the flock increases, the disease hazards also increase which in turn necessitates the use of sanitary methods and equipment. The feeding of poultry is probably the most important single factor in the health, production and profitableness of the flock.

Since 60 to 70 percent of the poultryman's total operating cost is feed expense, keeping well informed and adjusting feeding practices to prices of the ingredients without disturbing egg production is one of the duties of a good manager. In making changes, proposed formulas must be compared with original standard rations.

MASH FORMULAS (No. 8 & 8-S used as all-purpose mash)

	Nebr. No. 8	8-M with skim milk	Nebr. 8-s	Turkey Starter	Nebr. #14	What will it cost?
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	@....Cwt.--\$
Yellow cornmeal.....	310	410	310	250	210	@....Cwt.--\$
Corn gluten meal (45% protein) ---	---	---	---	---	---	@....Cwt.--\$
Shorts.....	200	200	200	200	200	@....Cwt.--\$
Bran.....	100	100	100	100	100	@....Cwt.--\$
Pulverized barley or whole oats	100	100	100	100	100	@....Cwt.--\$
Alfalfa Meal (No. 1 quality).....	100	100	100	100	200	@....Cwt.--\$
Meat scraps (55% protein).....	50	25	50	70	50	@....Cwt.--\$
Fish meal (65% protein).....	50	25	50	70	50	@....Cwt.--\$
Dried buttermilk.....	50	---	---	---	---	@....Cwt.--\$
Soybean oil meal (43% protein) ---	---	---	50	70	50	@....Cwt.--\$
Oyster shell or limestone (Chick-size).....	20	20	20	20	20	@....Cwt.--\$
Fine salt.....	10	10	10	10	10	@....Cwt.--\$
Suitable fish oil.....	10	10	10	10	10	@....Cwt.--\$
	1000	1000	1000	1000	1000	@....Cwt.--\$
Estimated protein content.....	13.2%	14.8%	18.8%	22.1%	19.4%	

Nebraska No. 8 is a well known formula that has been recommended by the Department of Poultry Husbandry for several years. It forms the basis of many of the chick starting feeds mixed commercially in Nebraska. It gives splendid results when used for growing stock or laying hens.

Nebraska 8-M is recommended for chickens of all ages when skim milk is available. To use 8-M successfully for laying hens the daily ration for each 100 hens should be about 3 gallons of skim milk.

Nebraska 8-S has given excellent results at the North Platte Experiment Station as the all-purpose mash used for chicks and hens in the Flock Testing Project. The "S" refers to the substitution of soybean oil meal in place of dried buttermilk.

The all-purpose mash is not to be confused with the all-mash method of feeding. As a starting mash with baby chicks, no grain is fed for the first few weeks. After the third week, scratch grain is added and gradually increased until it is freely fed from open hoppers at the time the pullets go on range. This open hopper plan of feeding grain and mash is continued until the pullets are put in laying houses in the fall. As layers, they are fed a limited amount of scratch grain and the same mash mixture is kept before them in open hoppers.

Nebraska 8-TS is a mash recommended for starting turkeys. In numerous experiments it has proved to be very satisfactory.

Nebraska #14 is a high vitamin mash formula for breeding flocks, both chickens and turkeys, which has given excellent results.

Alfalfa meal must be high in protein (18 percent +), low in fiber, and should carry a rich, green color. Carefully handled third and fourth cuttings often contain 20% protein. Alfalfa meal can be made from carefully handled home grown hay by grinding in a hammer mill equipped with a five-thirty-second inch screen. Dehydrated alfalfa meal (artificially cured) is excellent if leafy hay is selected for dehydration. Alfalfa meal should be stored in a cool, dark place to conserve the carotene which is the precursor of Vitamin A.

Yellow corn is more satisfactory than white corn because of its vitamin A factor. White corn can be used safely when the mash contains at least 10% No. 1 quality alfalfa meal and one percent fish oil.

Corn gluten meal obtained as a by-product of processing yellow corn, contains approximately four times as much vitamin A as yellow cornmeal. Relative prices sometimes warrant replacing 10% of the cornmeal in any of the formulas with corn gluten meal.

In grinding corn for poultry mash, it should not be ground finer than through a one-eighth inch screen. Hens fed free choice of coarse, medium and fine mash preferred coarser mashes. (Nebraska Experiment Station)

Experiments also show that chicks eat more and grow faster when coarser mashes are used.

Ground wheat is less desirable than shorts in the poultry ration because it contains less protein and tends to stick to the beak. At times price variations may warrant substituting coarsely ground wheat for shorts in the mash.

No substitution is recommended for the 10 percent bran. Regrinding grain is a wasteful practice.

Pulverized oats or barley have been interchanged in Nebraska poultry rations. Indications are that it is not necessary to grind oats used in the laying mash.

Increased growth and improved egg production occur when a mixture of meat scraps, fish meal, and one other protein concentrate is used in the ration instead of meat meal alone as the source of animal protein.

Hens eat whole corn, wheat, oats, barley, kafir, and hog millet seed readily. They are equipped to grind these grains efficiently. Market values and availability should determine which of these grains are to be used as scratch feed for the poultry. Good poultrymen favor using a mixture of these grains whenever possible.

FEEDING CHICKS

I. Feed a good and complete ration.

- A. The proper feeding of the right kind of feeds to healthy chicks in a clean, comfortable environment may be depended upon to keep them healthy.

II. Factors to consider in selecting or making feed.

- A. Digestibility. How much of the feed can be used and how much of it is indigestible.
- B. Composition. Are the proteins, carbohydrates, fats, fibers, minerals and vitamins of such nature and in such form and combination as to be used most effectively by the chickens?
- C. Palatability. Is the feed readily and ravenously eaten by the chicks?
- D. Wholesomeness. Is the feed free from mold, dirt, filth or other foreign and non-essential substances?
- E. Cost. Are you getting your money's worth? Do you use the maximum amount of home grown feeds? Have you studied open formulas and kept informed on the prices of ingredients?

III. When to feed.

- A. For the first 24 hours no feed at all is required.
 - 1. It takes about one day for the chicks to fluff out and get about well.
 - 2. Feed the chicks when they are from 24 to 48 hours of age or as soon as they have been put into the brooder house. Chicks that have been purchased from a hatchery and have been enroute as much as 24 hours should be placed in the brooder house and fed upon arrival.

IV. What to feed.

- A. Dry mash. The first feed that chicks have may be a good dry mash either made at home or purchased. They may have free access to it at all times.
- B. If sour milk is available, it may be fed to young chicks from the very start. When it is fed, however, a mash mixture containing less protein concentrates may be used. Note in the formulas that an adjustment for milk is included. Feed milk in crocks.
- C. Scratch grain. At three to four weeks of age chicks may have a grain mixture of two parts of fine cracked corn and one part of cracked wheat. As chicks develop, coarser grains may be used. When pullets go on range they may be fed whole oats.
- D. Green feeds. Tender, green feeds add bulk and vitamins to the ration and have a laxative effect which aids digestion and assimilation. Green feeds are essential to the continued health and development of chicks.
 - 1. Green feeds may be supplied in the form of alfalfa, dandelions, or lawn clippings cut into short lengths.
 - 2. Germinated oats fed after four or five days sprouting and when the chicks are one to two weeks of age are relished by them.

V. How to feed.

- A. Feed dry mash in open hoppers and keep it before the chicks at all times. Provide one inch of feeder space per chick.
 - 1. If all mash is fed and no grain at all, this is known as the all-mash system. It is used for broiler production but not recommended for pullets intended for layers and breeders.
 - 2. This system requires ample room at the feeders so that the chicks will feed and develop uniformly.
 - 3. Feed consumption and rate of growth can be increased by using lights.
 - 4. Use wasteproof feed troughs and screened platforms to prevent waste and insure sanitation.
- B. Scratch grain may be fed in the mash hoppers on top of the dry mash.
 - 1. This lessens the danger of chicks picking up disease germs as when grain is scattered in the litter.
 - 2. This permits more intelligent or better managed feeding because it is possible to more accurately note the amount of feed consumed.
- C. Feeding wet mash. Wet mash is often fed to encourage heavier feed consumption; in broilers particularly. Amounts that will be cleaned up in 10 to 15 minutes are fed as an appetizer about noon daily.

It is often customary to feed wet mash to broilers entirely for a week or ten days before they are marketed. Where this is done the birds are fed what they will clean up in about 10 minutes three to six times daily.

The same mash mixture that has been fed as a dry mash may be wet with either milk or water. When wet mash is fed to broilers for fattening purposes, it is usually made fairly sloppy or about like pancake batter.

- D. Green feed. Unless chicks are out on clean, tender grass range, some other form of green feed is recommended. Like the scratch grain, chopped green feed may be put in the dry mash hoppers on top of the dry mash. Put in what they will clean up in 5 to 10 minutes. This may be done once or twice daily.
- E. Fish oils. Fish oil, such as secured from sardines and cod fish is rich in vitamin A and D. Vitamin A prevents nutritional roup and improves the rate of growth. Vitamin D aids in mineral fixation (absorption of calcium and phosphorus) thus reducing the danger of rickets, crooked breast bones and soft-shelled eggs.
 - 1. Fish oil is a substitute for sunshine during the winter or whenever chickens are kept confined. It is necessary for broilers produced in batteries but to lessen the danger of a fish flavor, it is usually reduced or discontinued before the market time.
 - 2. Fish oil is usually used at the rate of about 1% in the mash mixture (1 pint in 100 pounds of feed).

Fish oils (continued)

3. To mix fish oils with the mash it may be first mixed with the cornmeal and the other ingredients added. Unless this is done a lumpy, poorly mixed mash is likely to result.

F. Feeding Equipment. Study feed equipment bulletins for instructions regarding the construction and use of practical, economical, and efficient feeding and brooding equipment.

FEEDING FOR EGGS

I. Feed a good and complete ration.

A. Profitable egg production is possible only through proper feeding.

II. In selecting a feed, consider the factors mentioned under chick feeding.

III. Feeding practices.

A. Dry Mash

1. The most common method of feeding dry mash is to keep it before the hens in open hoppers at all times.
2. Stimulate greater mash consumption, quantities, which the hens will clean up in ten minutes, may be wet and placed on top of the other mash in the open hoppers. This is an excellent winter-time practice when fed about the middle of the day.
3. To keep up body weight and lessen the danger of a fall molt, a "Flushing mash" is often fed about the middle of the day. This may be composed of equal parts of ground corn, shorts and finely ground oats and wet with skim milk. It may be fed on top of dry mash in quantities the hens will consume in about ten minutes.
4. To prevent waste, use wasteproof hoppers and do not fill them more than two-thirds full.
5. Increasing the amount of feed the hens consume daily stimulates egg production.

B. Scratch Grain

1. Feed daily about 12 to 14 pounds of scratch feed per hundred heavy hens and about 10 to 12 pounds per hundred Leghorn hens.
2. Feed scratch grain in hoppers on top of the dry mash. Never in filth and dirt.
3. Poultrymen often feed about one-third of the scratch in the morning and the remainder about one hour before roosting time.
4. Allowing free access to scratch grain is apt to produce fat hens and few eggs. During the winter months more scratch grain is usually consumed than mash. During the summer about equal amounts of scratch grain and mash are fed.

C. Succulent Feed

1. Green feeds improve the appetite and aid digestion.
2. Green feeds furnish vitamins, minerals and fiber.
3. There is some danger of green feeds, such as onion tops, affecting the quality and flavor of eggs.
4. Feeding daily three pounds of sprouted oats (dry weight) per hundred hens is a recommended practice. Oats are easily and

economically germinated by soaking in water over night and then hanging up to germinate in a burlap sack. If more than 12 or 15 pounds of oats are put into sacks, there is danger of mold.

5. Germinated oats are usually fed with the morning scratch feed and, like the scratch grain, may be fed on top of the mash. Do not feed oats on the ground or on the floor of the house because in their damp state, dirt and filth will cling to them.

D. Other Feeds

1. Alfalfa, as succulent green feed, hay in racks or alfalfa meal in the mash is an excellent and economical feed which should be included in the poultry ration. It is fed for its protein, vitamin, mineral and fiber content.
2. Alfalfa meal can be ground with a hammer mill equipped with a 1/8th inch screen.
3. Alfalfa may be used at the rate of 10 to 15 per cent in the dry mash.
4. It is now recommended that the poultry ration contain about 10% fiber whereas a few years ago less than 5% was recommended. The increased fiber content seems to lessen cannibalism and improve feather growth.

E. Minerals

1. Keep oyster shells or chick-size limestone before the hens at all times and include 1% fine salt in the mash mixture. These add to the palatability and calcium content of the ration. No other minerals need be added to carefully selected Nebraska grown rations.

F. Water

Keep clean, fresh water before the hens at all times in clean, filth-proof containers.

G. Fish Oils (See "Feeding Chicks.")

1. The hatchability of eggs seems to be improved through the use of fresh oils.
2. Eggs from hens fed fish oils contain ten times more vitamin D than eggs from hens not fed this product. Fish oils also improve egg shell structure.
3. Egg yolks are the richest common source of vitamin D and, therefore, constitute one of our most essential foods.

H. Grit

1. Provide hard grit for grinding feed. (Good Nebraska gravel is fine.)

COOPERATIVE FEED POOLS

By pooling orders for ingredients or feed ready for use, flock owners have reduced costs materially. Cooperative buying permits buying at wholesale prices. Cooperative feed buying has become an important factor throughout the New England States where it is reported market poultry production increased 110% in one year. (1937 over 1936)

Advantages of Cooperative Feed Pools

1. Groups buy at wholesale prices. Future needs can be estimated and sales increased.
2. Feed committee adjust formulas to prices yet provides complete ration.
3. Costs of re-grinding and fine grinding of ingredients are avoided.
4. Reduces charge usually paid for sacks.
5. Group pays minimum costs for grinding, milling and services.
6. Uniform feeding methods of community assures more uniform products.

PROTEIN CONCENTRATE FORMULAS

For good egg production, one must obtain a high feed consumption. Whole grains are more palatable than mash, but whole grains are all relatively low in protein, and need to be supplemented with protein concentrates in order to meet the requirements for sustained high egg production. The use of 30 per cent protein concentrates with grain, on approximately a one to four ratio of consumption, is being observed at the Agricultural Experiment Station Poultry Farm.

Concentrate Formulas

	4-OX	4-CXM	What will it cost?
	Lbs.	Lbs.	
Dry buttermilk.....	---	100 @.....	Cwt.\$
Corn gluten meal.....	100	--- @.....	Cwt.\$
Meat scraps.....	100	100 @.....	Cwt.\$
Fish meal.....	100	100 @.....	Cwt.\$
Soybean oil meal.....	100	100 @.....	Cwt.\$
Alfalfa meal, No. 1 quality.....	200	200 @.....	Cwt.\$
Shorts.....	280	280 @.....	Cwt.\$
Bran.....	100	100 @.....	Cwt.\$
Salt.....	20	20 @.....	Cwt.\$
	1000 Lbs.	1000 Lbs.	
Estimated protein level.....	31%	30%	

During the winter months 30 pounds of U.S.P. quality cod liver oil or its concentrate equivalent should be added to each 1000 pound mix.

Whole yellow corn, oats, barley, wheat and grain sorghums are recommended for the grain part of the ration, price and availability being the determining factor. Constant access to good quality alfalfa hay or chopped alfalfa during the winter months is also recommended.

At the experiment station, poultry farm pullets laid well thru the fall and winter on a free choice ration of concentrate and grain (in separate open hoppers) supplemented with a daily feeding of germinated oats and milk moistened fleshing mash. Turkeys made fastest gains on this same feed, fed the same way.

The fleshing mash consisted of three parts each of ground yellow corn, wheat shorts and ground oats and one part of soybean oil meal (by weight). This mixture was wet with skim milk to a rather wet consistency and fed daily about 11:00 A.M. in quantities the birds would clean up in about 15 minutes. Wet mash may be fed on top of dry mash and thus in the same feeders.

GRAIN SORGHUMS FOR HENS AND TURKEYS

Here is a question that is rather typical of many that we have received during the past few months. "Grain sorghums seem to be 'King' nowadays, and since corn is still hard to get in our neighborhood, I am wondering if we can use early kalo, sweet stalk kafir and feterita. Is one better than the other for chickens?"

The camel crops (grain sorghums) will indeed be life savers on many Nebraska farms this year. Experimental work to determine the relative value of different varieties for poultry has been in progress at the Nebraska Agricultural Experiment Station for over a year. Much still remains to be learned about vitamin and protein values, but the first experiments indicate that the pigmented varieties of the grain sorghums are better than the white types. Early kalo and Wheatland Milo proved to be better than some other sorghums in the first experiment which was recently concluded.

Experimental work has progressed far enough at the present time to justify the use of 50 per cent of grain sorghums in the grain part of the poultry ration if the mash part of the ration contains at least 30 per cent of yellow corn and ten per cent of good quality alfalfa meal. A typical grain mixture may be made of two bushels of kalo, one bushel of wheat and one of oats or barley.

Some folks have reported excellent results from feeding the sorghum in the heads, letting the hens do the threshing. It keeps the hens busy and happy. Turkeys are being used to harvest the low growing types right in the field. On a recent turkey tour we saw 1300 turkeys ranging in a 120-acre grain sorghum field south of Superior. This field was a beautiful sight with the vigorous red heads of gobbling turkeys going up and down the rows.

10706dg-5/42

HOW MUCH TO FEED

The best results in poultry feeding cannot be obtained unless complete rations are fed and the hens maintain a keen appetite at all times. The average feed consumption of hens at the North Platte Experiment Station during 1938 - 1939 is shown in the following table.

The amount of feed consumed by hens varies with the condition of the birds, the season of the year, the temperature and intensity of egg production. It is generally considered that uncomfortable temperatures affect appetites which in turn affects egg production. Consumption of feed may also be affected by use of artificial lights. From October 1st to March 20th, morning lights were used to give the hens a 13-hour day. In each 20' x 20' room, two 20-watt bulbs were used.

The 4-CX mash is a concentrate having approximately 31% protein. Mash and grains were fed free choice. The moist mash was fed at noon. The hens were in excellent condition throughout the year.

AVERAGE FEED CONSUMPTION PER HEN FOR 1938 - 1939

Month	Mash Nebr.8	Mash 4-CX	Wet Mash	Corn	Wheat	Oats	Totals	Ave. Eggs Per Hen
Oct. 1938	.98			1.49	2.19	1.30	5.96	16.7
Nov.	1.39		.45	1.88	2.08	1.40	7.20	20.6
Dec.	1.85	.69	.57	2.06	2.26	1.55	8.98	21.9
Jan. 1939		1.24	.60	2.25	2.18	1.70	7.97	18.4
Febr.		1.13	.55	2.02	2.02	1.07	6.79	17.1
Mar.		1.38	.57	2.02	2.34	1.22	7.53	21.7
Apr.		1.47	.60	1.90	2.45	1.04	7.46	20.7
May		1.66	.60	2.16	2.22	1.15	7.79	22.5
June		1.41	.53	1.79	1.79	.85	6.37	21.1
July		1.31	.62	2.04	2.14	.95	7.05	20.8
Aug.		.78	.71	1.75	1.91	.81	5.96	18.3
Sept.		.57	.56	2.29	2.29	.81	6.52	11.0
TOTALS	4.22	11.64	6.36	23.65	25.87	13.84	85.58	231.1

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How can farmers use a protein concentrate such as 4-CX to mix mash for baby chicks, growing stock, laying hens or turkeys that will be comparable with mashes mixed according to the Nebraska No. 8, No. 8-S or No. 8-TS formulas.

The following illustrates methods of judging values when farm grains are mixed with concentrates. Any of these mashes are comparable with Nebraska No. 8-S and baby chicks, growing stock and laying hens can be fed from the same bag.

	CHICKENS						POULTS		What will it cost?
	Amounts Used	Amt. of Protein	Amounts Used	Amt. of Protein	Amounts Used	Amt. of Protein	Amounts Used	Amount of Protein	
4-CX Concentrate	100 lbs.	30 lbs.	100 lbs.	30 lbs.	100 lbs.	30 lbs.	200 lbs.	60 lbs.	\$ _____
Ground Yellow Corn 1/8th inch sieve	1 1/2 bu.	8.4	1 bu.	5.6	1 bu.	5.6	1 1/2 bu.	8.4	\$ _____
Cracked wheat	1/2 bu.	3.6	1 bu.	7.2	1 bu.	7.2	1/2 bu.	3.6	\$ _____
Pulverized oats for young stock	1 bu.	3.84	1 bu.	3.84			1 bu.	3.84	\$ _____
Whole oats for stock over 3 months old									
Ground barley					1 bu.	5.76			
Suitable fish oil	2.5 lbs.		2.5 lbs.		2.5 lbs.		4 lbs.		\$ _____
Oyster shell (chick-size)	5 lbs.		5 lbs.		5 lbs.		7 lbs.		\$ _____
Total Amounts	253.3 lbs.		255.5 lbs.		271.5 lbs.		357 lbs.		\$ _____
Estimated % of Protein		45.84 18.08%		46.64 18.29%		48.45 17.9%		75.84 21.21%	

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Cost Per 100 Lbs. \$ _____