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The Utilization of Food Elements by Growing Chicks. XI. A Comparison of Ground Wheat and Ground Rye in Rations for Growing Chicks

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Summary

1. The effect of replacing the shorts and bran of a standard ration by ground wheat or ground rye was studied with two lots of newly hatched chicks.
2. Comparisons were made on the basis of equal intakes of dry matter and nitrogen by all chicks.
3. The wheat-fed lot made a significantly greater gain than the rye-fed lot.
4. Several cases of curled-toe paralysis occurred in the two lots, and a tendency to cannibalism appeared in the rye-fed lot.

The University of Nebraska College of Agriculture
Agricultural Experiment Station

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XI. A Comparison of Ground Wheat and Ground Rye in Rations for Growing Chicks

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THE COMPARATIVE FEEDING VALUE of rye and other grains was reviewed by Crampton (1). The consensus seemed to be that rye could replace wheat or barley up to 20 per cent of the ration. North (2) noted digestive disturbances when more than 30 per cent of rye was included in chick rations.

In this experiment the wheat bran and shorts of a standard Nebraska ration for growing chicks were replaced with either ground wheat or rye. The results of this investigation were summarized in an earlier report (3) and are presented in detail here.

Preparation of the Rations

The rations were mixed so that 25 per cent of the protein was furnished by either ground wheat or rye. The wheat used in the control ration contained 18.1 per cent protein and the rye had 15.7 per cent, so a mixture of 26 pounds of wheat and four pounds of dextrin was included in the wheat ration to furnish the same amount of protein as the 30 pounds of rye in the other rations. The balance of the ration was mixed in sufficient quantity for the two lots. One half this amount was mixed with the ground wheat and dextrin and the remainder with the ground rye. The rations were mixed as shown in Table 1.

After mixing, the rations thus prepared were machine pelleted by means of a 5/32-inch die to facilitate feeding without loss. The difference in the rations was the inclusion of wheat or rye, which contributed 25 per cent of the total protein of the ration. The analyses of the two rations are given in Table 2. The wheat ration was designated as 8-SW and the rye ration as 8-SR.

Table 1. Ingredients of the rations.

Ingredients	8-SW *Lbs.*	8-SR *Lbs.*	Protein *Pct.*
Ground yellow corn	31	31	9.3
Ground wheat	26	0	18.1
Dextrin	4	0	....
Ground rye	0	30	15.7
Pulverized oats	10	10	14.3
Alfalfa meal	10	10	13.5
Meat meal	5	5	48.9
Fish meal	5	5	68.6
Soybean meal	5	5	47.4
Calcium carbonate	2	2	.....
Sodium Chloride	1	1	.....
Cod liver concentrate	1	1	.....
Totals	100	100	

Table 2. Analyses of the rations.

Ration	8-SW *Pct.*	8-SR *Pct.*
Water	8.5	8.5
Ash	6.4	6.2
Nitrogen	3.03	3.03
Crude fat	4.7	4.3
Crude fiber	5.3	5.2
Protein	18.9	18.9
N-free extract	56.2	56.2

Experimental Feeding

The chicks used in this feeding trial were taken from a lot hatched on September 19, 1940, from a Dark Cornish male and White Leghorn female cross. Thirty-five chicks weighing between 37 and 39 grams were selected for the experiment and banded on the second day after hatching. They were kept on wire in electrically heated brooders. Loss of feed was prevented by providing single cells for each chick and permitting access to the feeding tray only at intervals, during which the pelleted feed was consumed readily without loss. Consumption of all feed offered was guaranteed by retrieving all pellets scattered in the feeding cell and replacing them in the feeding tray.

Water was before the birds at all times. Cod liver oil concentrate was incorporated in the mash at mixing and before pelleting. All the 18 chicks started on the 8-SW, as well as the 17 started on the 8-SR ration, completed the feeding trials on November 1, 1940. During the six-week feeding period each chick consumed 896 g. of feed, the composition of which is given in Table 2. Each chick thus received 820 g. of dry matter, 169 g. of protein, and 27.15 g. of nitrogen. The amounts present in the chicks at slaughter are shown by lot and sex in Table 3.

Table 3. Summary of growth and analytical data on chicks.

Lot	Ration 8-SW		Ration 8-SR	
Sex	Male	Female	Male	Female
Number of chicks	8	10	9	8
Net weight (g.)	425	407	400	383
Gain in weight (g.)	387	369	362	345
Dry matter fed (g.)	820	820	820	820
Rate of gain (pct.)	47.2	45.0	44.1	42.1
Gain per g. N. fed (g.)	14.3	13.6	13.3	12.7
Nitrogen in chicks (pct.)	3.26	3.27	3.26	3.32
Nitrogen in gain (pct.)	3.33	3.37	3.34	3.41
Nitrogen intake (g.)	27.15	27.15	27.15	27.15
Nitrogen in gain (g.)	12.90	12.47	12.09	11.77
Nitrogen retained (pct.)	47.5	45.9	45.1	43.3

Discussion

Table 2 gives the distribution of sexes within the lots, together with the mean net weight, gain in weight, and the introgen in the chick at slaughter. From earlier data (4), the nitrogen in the newly hatched chick was found to be 0.95 g., so the retention of nitrogen was calculated on that basis. The data show that the lot fed the ration containing wheat made a greater rate of gain and retained more of the nitrogen fed than the rye-fed lot. The mean net weights of both the males and females fed wheat ration were six per cent greater than those fed rye. Appropriate tests showed that this difference was highly significant statistically.

Symptoms of curled-toe paralysis were exhibited by four chicks on the rye ration, and by two chicks on the wheat ration. The first case was noted on the 21st day, and others occurred at intervals during the remainder of the trial. Riboflavin was administered by pipet to relieve the symptoms.

A marked tendency to cannibalism was noted in the 8-SR ration. This was never allowed to become serious as victims and aggressors were immediately isolated. Had this precaution not been taken, toe and feather picking would have been severe, but the condition was not permitted to interfere with the experiment. This condition is associated with feather growth, and has been noted in earlier work where ground wheat or shorts made up one-half the ration (5). It is apparent that these rations are deficient in a factor required for full feathering, and are border-line in riboflavin content. The calculated riboflavin contents of the rations are slightly lower than those given in recent allowances for poultry (6).

Literature Cited

1. Crampton, E. W.
   1936. COMPARATIVE FEEDING VALUES FOR POULTRY OF BARLEY, OATS, RYE, AND CORN. Dom. of Canada, Nat'l Res. Council Report No. 29.
2. North, M. O.
   1934. POULTRY FEEDING, HOUSING AND LIGHTING EXPERIMENTS. Wyo. Agr. Exp. Sta. Bul. 203.
3. Fifty-Fourth Annual Report.
   1940. NEBR. AGR. EXP. STA. 49–50.
4. Ackerson, C. W.; Blish, M. J.; Mussehl, F. E.
   1935. NEBR. AGR. EXP. STA. RES. BUL. 80.
5. Mussehl, F. E.; Ackerson, C. W.; Blish, M. J.
   1940. NEBR. AGR. EXP. STA. RES. BUL. 119.
6. Committee on Animal Nutrition.
   1944. NAT. RES. COUNCIL. NO. I. RECOMMENDED NUTRITION ALLOWANCES FOR POULTRY.