Studies in Pigeon Nutrition

addition of vitamin supplements to commercial pigeon ration investigated for effect on squab production

Fred T. Shultz, C. R. Grau, and Phyllis Zweigart

Production of marketable squabs increased after certain vitamins—important for reproduction by fowl—were added to a basal ration similar to commercial pigeon feed mixtures.

The effects of four vitamins, A plus D, riboflavin, and B_{12} were tested on three strains of commercial White King pigeons.

Strain *A* consisted of old birds producing large squabs at a relatively low rate.

Strain *B* consisted of young birds which had come into production two months before the feeding trial started. These birds produced squabs almost as large as those from strain *A* but at a higher rate.

Strain *C* consisted of old birds producing relatively small squabs at a rate intermediate to strains *A* and *B*. Due to the differences between these strains, all comparisons between diets were within strains.

Birds were housed in 12 pens containing 35 pairs each. Managemental practices except for the diets were the same for all pens. No culling was done until the close of the experiment at which time the poorest producing pairs were removed.

The basal diet consisted of a mixture of 40% sweet corn, 30% kafir and milo, 20% wrinkled peas, and 10% wheat. In addition a grit mixture containing limestone, oyster shell, bone meal, iodized salt, and iron oxide was free-fed to the birds.

The supplements were fed at the following levels:

Vitamin A—2280 international units per pound

Vitamin D—428 D_3 international chick units per pound

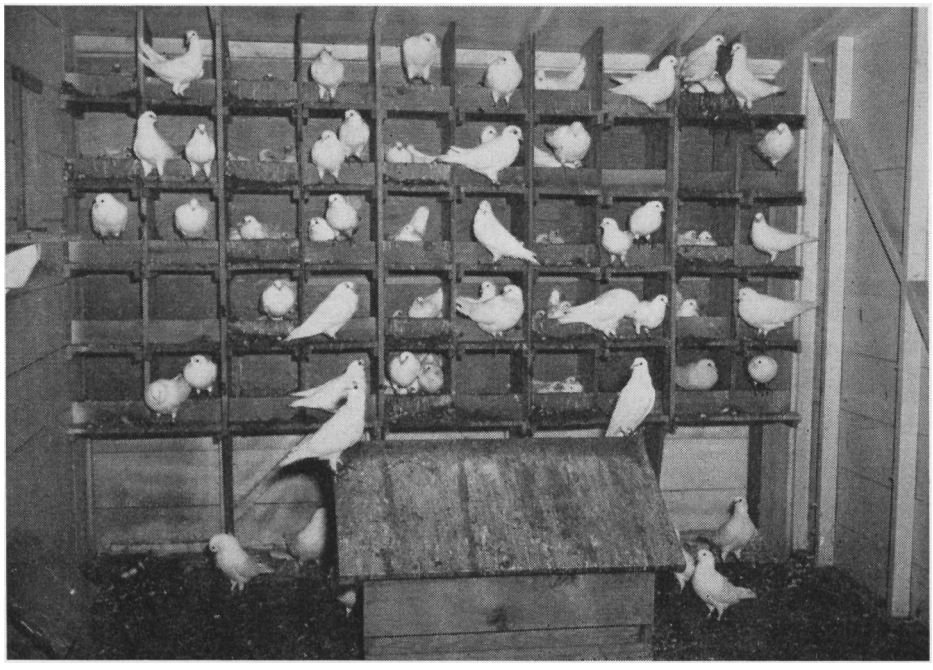
Riboflavin—one milligram per pound

Vitamin B_{12}—3.44 micrograms per pound

Cane molasses was used to bind the vitamin supplements to the whole grains. Molasses was also added to the basal diet.

The supplemented diets were fed in self-feeders from June through December 1951. Before June all pens were on the basal grain mixture only. After December all pens were returned to the basal grain mixture alone until March 1952.

The addition of vitamins A and D to the basal diet—tested on strain *C* only—did not appear to have had any effect on squab number.



Type of pen used in pigeon nutritional studies with vitamin supplements. Waste-proof self-feeder is shown in the foreground.

Addition of riboflavin noticeably increased squab number—tested on strains *A* and *B*—and the effect still was evident in the first month—January—following the supplemented period. By the third month—March—following the return of all pens to the same diet, differences between diets had disappeared.

When the basal diet was fed to strain *A* a total of 267 squabs was marketed from July 1951 through January 1952. In those pens where riboflavin was added, 337 squabs were marketed in the same period. The addition of B_{12} also appeared to have been helpful. It further increased the number of squabs marketed to 381.

Addition of riboflavin to the diet fed to strain *B* increased the number of marketed squabs from 480 to 558.

The effects of riboflavin in strain *A* and *B* were statistically significant at the 5% and 1% levels respectively. The effect of B_{12}—strain *A*—was not significant.

Records were taken to determine whether the number of marketed squabs increased because more eggs were laid per pair, or because more eggs hatched, or because more squabs survived the first 28 days.

Production records were kept for a six-months period beginning and ending 15 days after the beginning and ending of the period of supplementation. Eggs whose hatching date fell within this period were counted.

The tests showed that the larger part of the increase in squab number was due to an increase in hatchability, both riboflavin and vitamin B_{12} being effective. the riboflavin diets raised hatchability 11% in strain *A*, and 8% in strain *B*. Vitamin B_{12} appeared to have resulted in an additional 3% increase.

Some of the increase in squab number was due to better survival—greater livability. Riboflavin-supplemented diets increased livability 3% to 4%. Added B_{12} supplement did not improve livability.

No differences in number of eggs laid were evident.

No consistent difference between diets in squab weight was noted.

Squab number in all pens showed a tendency to decline during the period in which this experiment was carried out. It was highest during the late spring months and lowest during the fall and winter

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Sugar Beet By-Product Tested

alternate for molasses palatable to cows when mixed with concentrates and does not affect milk quality

S. W. Mead, Albert Weber, and Walter L. Dunkley

No off-flavors were imparted to milk through feeding trials with a condensed beet solubles product—MC-47.

Investigations were conducted to determine the effect of the use of MC-47 instead of molasses on the palatability of the resulting dairy mix and the possibility of its causing undesirable milk flavors.

Ten milking cows from the University herd were separated into two equal groups. Both groups were changed abruptly from their accustomed University concentrate mix which contained neither molasses nor MC-47. Each cow in group *A* received four pounds of a common dairy mix containing 7.5% blackstrap molasses twice daily, 1½ to two hours before milking, for five days. The cows in group *B* were handled in an identical manner except the mix they received had 10.5% MC-47 replacing the molasses.

Eating time for each cow was determined when the change was made to the experimental mixtures and thereafter at each afternoon feeding.

Samples of milk obtained from each cow both before and daily during the experiment feeding period were analyzed for flavor.

At the end of five days the two groups were reversed and again eating time was recorded and milk samples obtained for flavor tests.

Following the second five-day period, a third group of six additional cows and the five higher producing cows from the combined groups, *A* and *B*, were given, at one feeding, 11 or 12 pounds each of the mix containing MC-47. The six cows added to the trial had been receiving the University mix and three of the other five had been receiving the mix containing molasses. All 11 cows were changed abruptly to the mix containing MC-47.

When the mixtures under test were first introduced there was some indication that the cows were reluctant to accept the new feed, which was to be expected because cows are critical of changes in feed.

Individual cows varied in eating time regardless of the mixture. After the second feeding it was impossible to distinguish between the two mixtures as to eating time. The cows receiving 11 or 12 pounds of MC-47 mix at one feeding consumed their feed with relish. None of the feed was refused.

Maximum feed flavor is evident in milk when a flavor producing feed is consumed by cows one or two hours before milking. Off-flavors can be prevented by withholding such feed during the five-hour period preceding milking.

The experimental feeds containing molasses and MC-47 were fed 1½ to 2 hours before milking.

Flavor tests showed the milk—all samples were identified by code only—to be of the same quality before and after the feed change to the experimental mixtures. The milk produced by the cows receiving the MC-47 mix could not be identified by flavor tests nor distinguished from the milk produced by the cows receiving the molasses mix.

To further test the palatability of MC-47 in combination with other feeds and its possible effect on milk flavor, a feeding trial involving 173 milking cows was conducted in Los Angeles County.

The cows were divided into three groups, each receiving the same basic concentrate mixture and chopped alfalfa hay. One group of cows received hay containing 10% MC-47, the second group was fed hay with 10% molasses added, and the third group received hay containing 5% molasses and 5% MC-47. Thus each group served as a control for the other two. The average daily consumption was 11 pounds of concentrates and 25 pounds of hay per cow. Each cow consumed an average of 2.6 pounds daily of either MC-47, molasses or equal parts of MC-47 and molasses.

At the end of the first 30 days each group was changed to one of the other feeds. This phase of the experiment lasted 15 days and then each group was returned to its original trial mixture.

Group No.	No. of cows	Supplement added to hay		
		Period I (31 days)	Period II (15 days)	Period III (13 days)
1	89	10% Mol.	10% MC-47	10% Mol.
2	42	5% Mol. 5% MC-47	10% Mol.	5% Mol. 5% MC-47
3	42	10% MC-47	5% Mol. 5% MC-47	10% MC-47

Though the groups were changed abruptly from one feed mixture to the other, there was no indication that one was more or less palatable than the others.

No off-flavors were reported—during the entire feeding period—by the dairy plant to which the milk was shipped and where its average rating was 94%.

In the first trial—conducted at Davis—none of the cows received more than 0.9 of a pound of MC-47 per feeding or 1.8 pounds per day. The cows used in the Los Angeles County trial received an average of 2.6 pounds daily.

Neither trial was designed to investigate the effect of larger amounts of MC-47 on milk flavor nor the effect of a more extended feeding period. The palatability of MC-47 fed alone rather than in combination with dry concentrates or hay was not investigated.

Further studies are planned in an attempt to answer these questions. Trials under way will give information concerning the digestibility of MC-47.

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months when the adult birds were going through the molt. Squab weight on the other hand, was highest when squab number was lowest indicating a negative correlation between squab number and weight. Even though the rate of production was increased considerably by the addition of riboflavin and B_{12}, no decrease in squab weight attributable to this cause occurred in the supplemented pens. The addition of these vitamins to the diet increased squab number without decreasing squab weight.

The addition of vitamins A and D did not appear to add to either squab number or weight. Further tests of these vitamins are needed before the levels contained in the basal diet are considered adequate.

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The above report is based on studies conducted with the co-operation of Ralph and Don Weaver, Weaver Squab Farm, Santa Clara County.