Poultry Husbandry Report, 1948

a brief progress report on research findings by the staff of the Division

The following report was prepared by the staff members of the Division of Poultry Husbandry under the direction of Professor L. W. Taylor, Chairman of the Division of Poultry Husbandy, and Poultry Husbandman in the Experiment Station, Berkeley.

Much of the material accumulated in the 1948 investigations on inbreeding of chickens awaits complete analysis but several developments may be cited herein.

The results of inbreeding combined with selection for egg number and egg size, indicate that selection in small flocks is powerless to overcome the inbreeding degeneration in egg production. On the other hand, inbreeding does not interfere with selection for either large or small beginning egg weight.

The optimum structure of breeding flocks selected for a high production index received special emphasis in the 1948 investigations. The possibility of part-year trapnesting and of breeding from pullets was particularly investigated and from a theoretical analysis this procedure seems to lead to a breeding plan of greater efficiency than others studied.

Bloodspotting

Further advances were made in the breeding selection for the bloodspotting tendency in White Leghorns. The data for the last complete first-year production show a thirteen-fold increase in the percentage of eggs containing blood spots in the selected over that of the control line.

Causes of Death

The study of heritability of economic traits of chickens was extended to include viability. It was determined that the heritability of death from all causes in the course of the first laying year is about 9%, from causes other than lymphomatosis 6–7%, from lymphomatosis about 5%, and from disorders of the reproductive system 2–3%.

Turkeys

When comparatively large, broad-breasted Bronze turkeys are crossed with smaller, narrower-breasted Bronze turkeys, the progeny are more nearly like the larger parent in weight, but intermediate in width of breast. Backcrosses on the parents are intermediate in width of breast between the parent and the first cross, but the weight depends on the backcross made; if backcrossed onto the larger parent the birds weigh about as much as the parental strain. If backcrossed onto the smaller strain the progeny are intermediate between the parent and the first cross.

Length of shank was apparently controlled by the same factors that control weight, but length of keel and width of breast showed considerable variability independent of weight of birds.

These results confirm earlier work with turkeys and chickens and indicate that width of breast and length of keel may be modified by selection without corresponding changes in body weight. This would be at least very difficult in the case of length of shank. The slight negative correlation between length of keel and width of breast was confirmed.

Amino Acids

The sulfur amino acid requirements of turkey poults have been determined and found to be 0.5% of methionine and 0.3% of cystine for the optimum rate of growth. Methionine may completely replace cystine in the ration, but cystine cannot replace methionine.

A failure of feather pigmentation which results in a white bar on the flight and tail feathers of Bronze poults could be produced by feeding proteins deficient in lysine. It takes approximately two weeks for the white bar to develop after poults are fed a lysine-low ration. Adding a protein which is low in lysine to a satisfactory chick diet may result in poor growth, despite the higher level of protein in the diet. This effect is explained by the fact that increasing the protein level causes an increase in the requirement for lysine. The methionine requirement is also increased somewhat, but the tryptophane requirement was apparently not affected by an appreciable increase in the protein content of the diet.

These results emphasize the importance of maintaining a proper balance of amino acids in all diets, and the inadvisability of raising the protein level through the use of poor quality proteins.

Metabolism of Tryptophane

Rations deficient in the vitamin nicotinic acid produce good growth if an ample amount of the amino acid tryptophane is supplied and it is known that tryptophane can be converted to nicotinic acid in the rat.

Work with radioactive carbon on various mammals in association with the Radiation Laboratory and Home Economics Department has thrown light on the formation of intermediary compounds of metabolism between tryptophane and nicotinic acid. Tryptophane metabolism in chicks is being studied.

Pancreas and Raw Soybeans

The pancreatic ducts of chicks were tied off, shutting out the pancreatic secretions from the intestine. Virtually all of the enzymes breaking down protein at pH 7.6—pH is a measure of acidity and alkalinity—disappeared from the gut and a great decrease in digestibility of the food occurred. The pancreas thus seems to be a key organ in nutrition of the bird.

The condition of the pancreas of normal chicks is influenced by the ration fed. Raw soybeans cause an enlargement of the gland and an increase in its content of an enzyme, trypsin, which acts upon proteins. Raw soybeans contain an antitrypsin which is presumed to be the cause of the poorer growth produced by this feedstuff. Tests are now under way to correlate growth-promoting value of soybean meals with their antitrypsin activity.

Growth Inhibitors

Levels of alfalfa meal in excess of 5% of the ration have produced poorer growth rates of young chicks than lower levels.

The growth-inhibiting material can be brought into solution only with great difficulty. Evidence obtained indicates that the inhibitor is not fiber, nor is it produced by ordinary curing or dehydration of alfalfa since it is present in alfalfa frozen in the field and dried without the use of heat.

In a continuation of the investigation of the nutritive value of linseed oil meal, it was found that the growth-depressing effect of this product can be prevented by supplementing the ration with pyridoxine, one of the B-complex vitamins, which has the same effect as previously observed method for treating the linseed

oil meal with water. Poults, like chickens, respond favorably to the addition of pyridoxine to the ration or to water treatment of the linseed meals.

Water Weeds

A sample of dried fresh-water weeds was made available for a poultry feeding test. At the 10% level it depressed growth less than an equal amount of alfalfa meal and seemed satisfactory as a feedstuff for poultry. Its feeding value would depend largely upon the carotene and B-complex vitamins which it contains.

Lights on Turkey Hens

Continued work with turkeys has shown that seven-month-old turkey hens given all night lights start laying a little earlier than hens given a 14- to 15-hour day. However, there has been little difference in early egg production of hens given a 14- or 15-hour day and those on all-night lights, and no difference in total egg production to the end of May.

There has been more difficulty with the all-night light pens, such as early infertility, more broken eggs, and lower hatchability, but the differences from other pens have not been consistent enough to be certain that they are the result of using all-night lights.

Until further information is available, 14-hour days are recommended. Earlier work showed that the light intensity of the birds should be at least 2 ft. candles.

Laying pullets in a climatic chamber were exposed to air temperatures for one week at each of the following temperatures: 70°, 80°, 90° and 100° F.

The pullets lost weight as the temperature increased. Feed consumption at 100° F was only 42% of that at 70° F, while water consumption was increased to 135%. Body temperature was raised and the heart rate was lowered by increases in environmental temperatures.

Egg production practically ceased when air temperatures reached 100° F, while egg weight and shell thickness were reduced by continuous temperatures over 70° F. Two or three weeks were required for egg weight and egg shell thickness to return to normal following their depression due to high air temperatures.

White Leghorns showed less rise in body temperatures than New Hampshires or Rhode Island Reds. Egg production declined markedly in New Hampshires and Rhode Island Reds when the air temperature was 90° F, and in Leghorns at 100° F.

The feeding of iodinated casein did not prevent a decline in egg production due to high temperatures.

Dubbing—the removal of comb and wattles—apparently did not influence the ability of White Leghorns to withstand high temperatures.

Artificial Insemination

Insemination of turkeys with 1/40 cc. of undiluted semen maintains over 90% fertility for 3 weeks. During the fourth week fertility declines slowly; it drops rapidly thereafter, and disappears by the end of the eighth week.

When 1/80 cc. of semen is used, the early fertility is as high as obtained with the larger dose and the total duration is the same, but the percentage of fertile eggs starts to drop abruptly two weeks after insemination.

In contrast to results on egg production in turkey hens, no influence of artificial lighting was observed on the initiation of sperm production by turkey males.

Dirty Eggs

Results of studies on bacterial infection of eggs have emphasized the importance of preventing soiling. Bacteria may penetrate the shell very readily if an egg is soiled with moist infected material while the egg is still warm. Having penetrated the shell, the bacteria cannot be removed by eliminating the surface dirt.

Care of Hatching Eggs

Further work indicates that temperatures of 40° and 70° F gave about the same results as 55° F in terms of per cent hatch of fertile eggs when eggs were kept at these temperatures for one week. Some chicken eggs, both Leghorn and New Hampshire, were not adversely affected by a temperature of 34° F, for one week. Temperatures above 70° F gave variable results, but with some exceptions tended to reduce hatchability of chicken and turkey eggs.

Wire-floored turkey pen at Davis for studying nutritive requirements of breeding hens.