

## The effect of early feed restriction on the death loss, growth rate and final maximum body weight of broiler chickens

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### Abstract

This study was designed to examine the effects in broiler chicks of both sexes of an early period of severe feed restriction. The effect of severe feed restrictions at an early age was investigated in straight run Hubbard broiler chickens. Chicks were fed (chick starter) ad libitum until day 7. The restriction period was for 12 d beginning on day 8 after hatching. The chicks were fed in 3 different treatments; 1) continued ad libitum, 2) minimum daily requirement, and 3) minimum daily requirement on alternate days. Minimal weight gain was noted during the restriction period. From day 22 to the day 27, chicks were returned to the ad libitum basis. Beginning day 28 chicks were fed a grower ration. Chicks fed on the ad libitum basis had a significantly higher death loss and body fat content. Broilers fed on the restricted basis had less death loss and lower body fat. The results of this study indicated an interaction between the sex and the type of treatment. It is noted that reduced growth can be compensated for by refeeding after the restriction period.

### Introduction

The use of feed restriction in poultry production has been a common practice for many years. Greater consumer awareness and concern about dietary fat has caused pressure on the broiler industry to reduce the fat content in their products (Jones and Farrell, 1992). In recent years, feed restriction has been investigated in broilers, mainly to improve feed efficiency and reduce body fat deposition (Pinchasov, 1988). The selection of broiler chicks has been for increased body weight and rapid weight gain resulting in considerably heavier commercial broilers that are marketed at a progressively younger age (Gyles, 1989). Along with improvements in broiler performance, broiler mortality has increased. The major causes of the increase in mortality are poor chick quality (early mortality), and cardio/pulmonary disorders such as sudden death syndrome (SDS) and ascites (Scheidler, 1992). The changes in broiler selection have generated interest in nongenetic procedures to improve feeding strategies that would result in lean body mass, minimum feed intake with maximum final body weight (Yu, 1990). Limiting nutrient intake during portions of the early growth phase has shown promise in limiting fat deposition and lowering death loss in broilers (Plavnik, 1986). Chickens are nibblers, when food is provided for ad libitum access, chickens eat small amounts at frequent intervals. It has been hypothesized that early feed restrictions and refeeding alters the growth curve. Limiting the feed intake depresses the growth in the broiler chickens during the period of restriction, but reduced growth may be compensated for by refeeding (Yu, 1990). The purpose of this study was to examine the effects in broilers of both sexes of an early period of severe feed restriction and to examine fat deposition at market age.

### Materials and Methods

Day old Hubbard straight run broiler chicks were obtained from Midwest Feed in Hutchinson, Kansas. Chicks were toe punched to maintain identity with regard to the treatment. Each trial consisted of 6 groups of 18 chicks. The chicks were placed under brooders. Temperature in the brooders for the first 48 hours was maintained at the 47-51°C temperature range. After the first 48 hours temperature was maintained at approximately 45 °C. Chicks remained under the brooders for 14 d. The chicks were housed in a 3.6 m by 6.7 m coop with a concrete floor. The coop was divided into 6 pens of equal size equipped with manual waterers and feeders. Ventilation was provided in the coop by southern exposure windows which could be raised or lowered.

The first trial began May 13, 1993 and ran for 56 d. This trial was replicated beginning on July 16, 1993.

All groups were fed ad libitum for the first seven days. Group 1 was a control group and was fed ad libitum through out the entire trial. Group 2 was placed on a minimum requirement (see Table 1) feed intake for 12 d beginning on day 8. On day 22 they were returned to ad libitum feeding. Group 3 was fed on an alternate day feeding schedule from day 8 to day 21 and then returned to ad libitum feeding schedule. Birds in Groups 2 and 3 were only fed the minimum requirements during the restriction period.

All chicks were fed a 22% crude protein commercial starter (Table 2) through day 27. On day 28, all chicks were placed on a commercial finishing ration (Table 2) with 17% crude protein. Chicks were fed this ration until day 56. The estimated average live weight at day 56 was 2.0 kilograms.

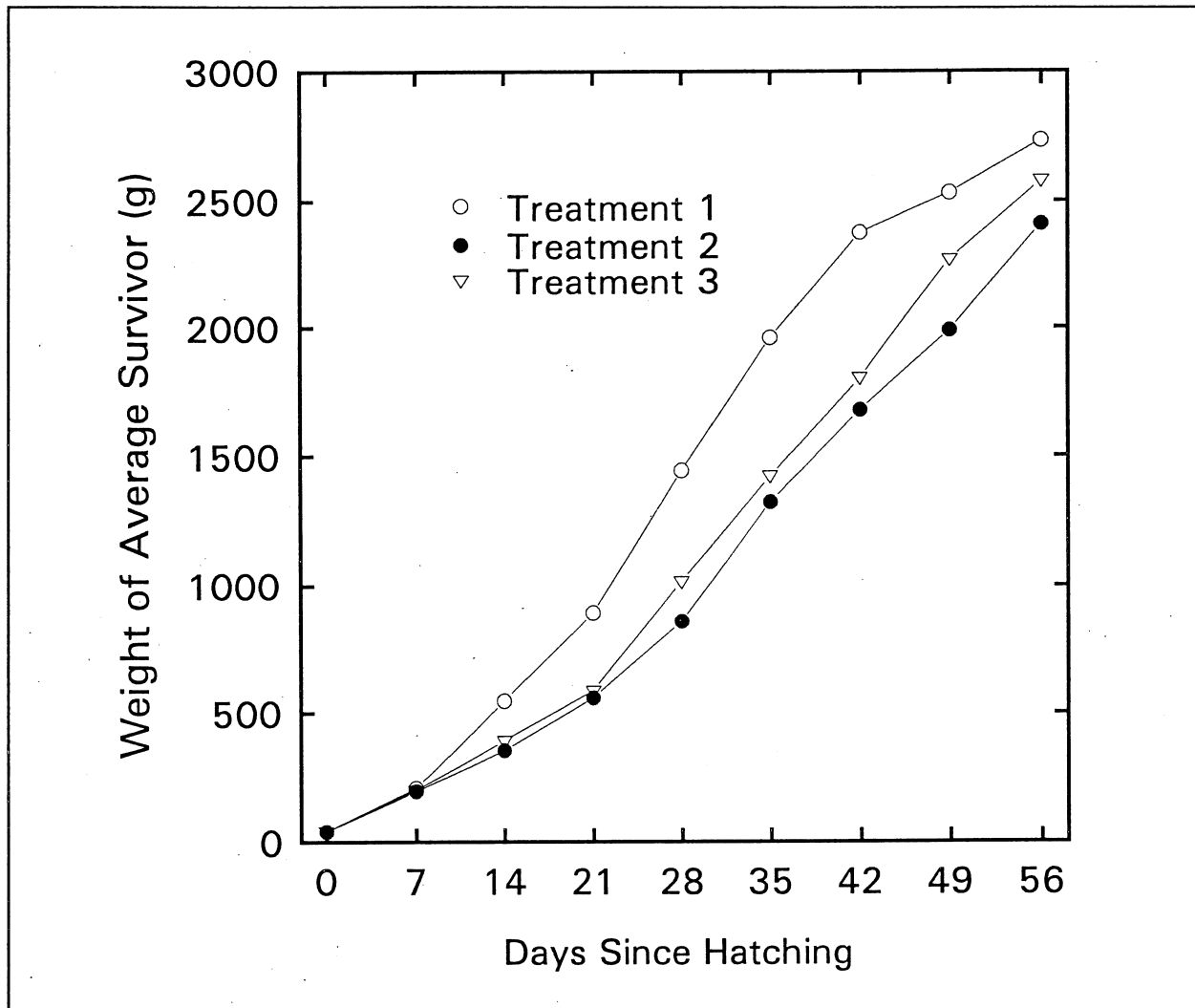


Figure 1.

Table 1. Estimated daily feed requirements per week per chick.

Week	Feed
0 - 1	.1256 kilogram
1 - 2	.2696 kilogram
2 - 3	.4406 kilogram
3 - 4	.6638 kilogram
4 - 5	.8434 kilogram
5 - 6	.9806 kilogram
6 - 7	1.0719 kilogram
7 - 8	1.1187 kilogram

Two chicks of about average weight from each group were butchered and fat was measured. Solid fat was removed after skinning and the chickens were

then heated and liquid fat was removed and cooled. Fat samples were then weighed. Feed consumption and chick weights were recorded weekly.

To reduce any difference in stress levels and human contact, each pen was entered daily whether or not feeding took place. Broilers were bedded on wood shavings. Four times during each replication, new bedding was placed in the pens to maintain good sanitary conditions.

Table 2. Feed consumption data for the three treatment groups.

Feed Consumption	(kg/group)	(kg feed/kg bird)
Group 1	398.63kg	3.3038
Group 2	381.90kg	2.245
Group 3	362.65kg	2.000

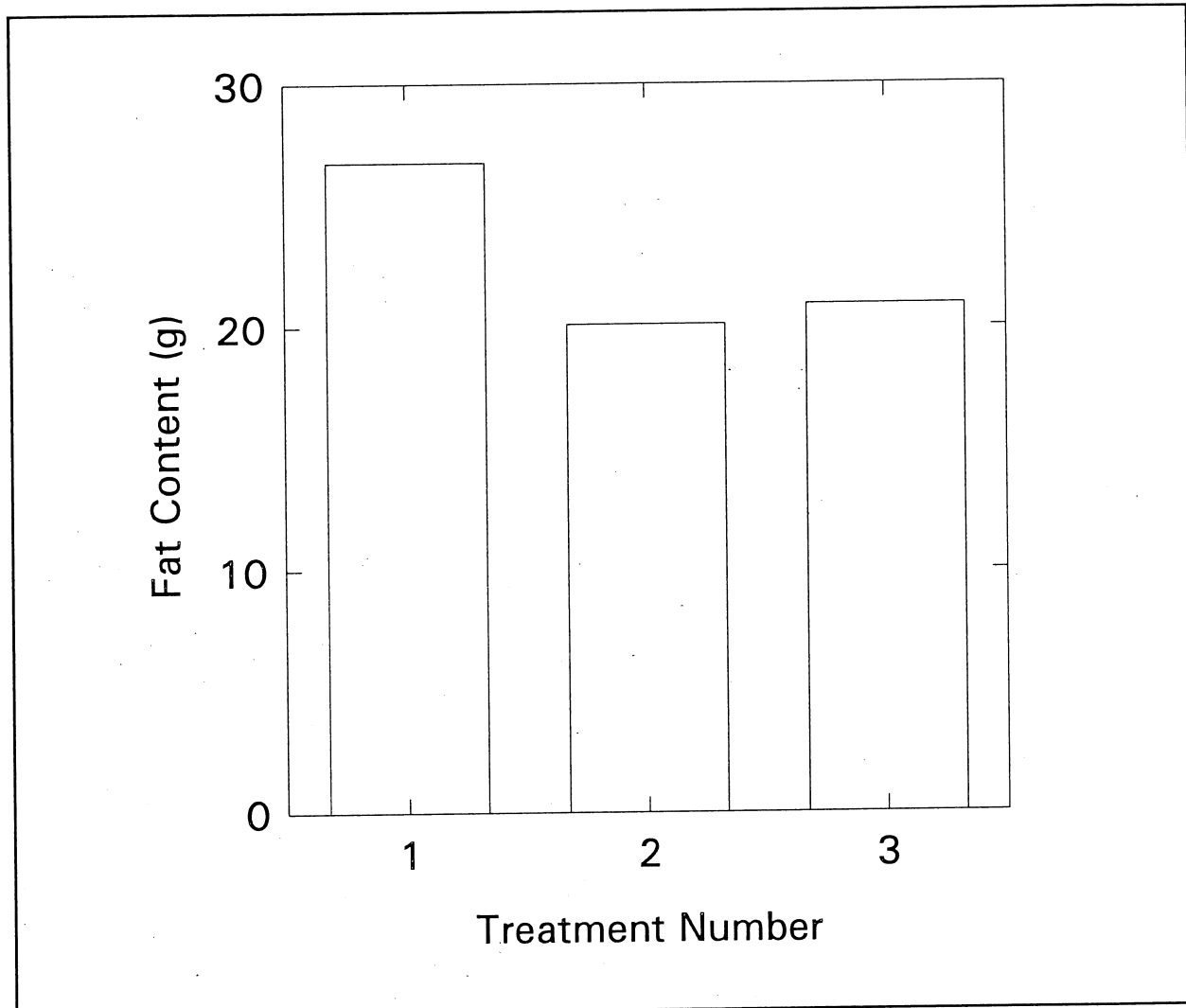


Figure 2.

For this study, ad libitum was defined as free access to food with little or no waste. Chicks were allowed all the water they wanted during this experiment.

Data were analyzed using the MANOVA routine of SPSS/PC+.

### Results

There was a correlation between the sex of the broiler and the treatment. For roosters, Group 1 had a higher weight gain than did Group 2 ( $P < .05$ ). The hens in Group 1 had a higher weight gain than Groups 2 and 3. The average broiler weighed 2.57 kilograms with the average rooster weighing 2.78 kilograms and the average hen weighing 2.40 kilograms. There was an increase in death loss in Group 1 as the birds reached maximum weight. Group 1 birds reached peak weight sooner at approximately 42 d than those in Group 2

and Group 3 as indicated in the growth curve (Figure 1). Death loss in the final days of the trial resulted from SDS or cardio-pulmonary disorders and was observed in 22 of the larger, heavier roosters in Group 1. Birds fed on the restrictive basis, Groups 2 and 3, were observed to become more aggressive and cannibalistic toward other birds in the same pen. Death loss figures were 33%, 2.8%, and 2.8% for treatments 1, 2, and 3, respectively.

Body fat deposition was higher in Group 1 than in Groups 2 and 3 (Figure 2). The results showed the restricted feeding lowered the overall body fat content of the birds. Feed efficiency was highest for Group 3 roosters compared to the entire experiment (Table 3).

### Discussion

The results compared to previous studies done by Scheifeler and Baughman, 1989 at the North Carolina

**Table 3.** Feed composition analyses used in this study. Numbers indicate percent by weight.

Component	22% Starter	18% Finisher
Corn	57.044	54.067
Milo	0.0	14.746
Soybean	33.482	22.118
Meat Scraps	4.96	4.915
Calcium	.992	.983
Other	3.522	3.171
Crude Fat	≥2.80	≥3.00
Crude Fiber	≤3.80	≤4.00

State. It was expected that market weight would not be limited using the restrictive feed program. Refeeding allowed the birds to compensate in their weight gain for any restriction during the treatment. Benefit of feed restriction in this trial was a marked reduction of birds to SDS. The birds weighed grams than I predicted they would. It seems possible that with a carefully managed program, these broilers could be marketed at an earlier age, especially the roosters. The death was as I anticipated with the largest loss being in Group 1. The growth curve demonstrated the rapid weight increase in treatment 1 compared to treatments 2 and 3. Fat deposition was higher in the birds fed on the ad libitum diet while the restricted birds showed lower fat levels.

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