> Scientific Reviews

173115

Categories: Broiler Nutrition | Poultry Health

Optimal Age for Feed Restriction + Microelement Supplement to Control Ascites and Leg Problems of Broilers at 49 Days of Age

Source: Maria E. Suarez O, Marco A. Camacho E. and Carlos M. Garcia-Bojalil - Colegio de Postgraduados, Edo. de Mexico, Mexico (dated 27/09/2004)

Introduction

Two of the more pressing problems currently facing the broiler industry are the high mortality rate from ascites and leg problems.

Ascites is a metabolic problem caused by several factors such as incubation condition (Camacho and Suarez, 1996a) shell quality (Camacho and Suarez, 1996b), altitude (McGovern et al., 2000), environmental temperature and growth rate of the bird (Wideman, Jr. Et al, 1995 ; Ruiz-Feria et al., 2001) and their interactions To reduce mortality rate from ascites, quantitative and qualitative feed restriction have been recommended as a management practice; however, most of the time final body weigh and yield of certain parts of the carcass of the restricted birds are lower than those of the groups fed ad-libitum (Leeson et al., 1992 ; Acar et al., 1995 ; Leeson et al., 1996). According with the literature, this indicates that intensity of restriction (Suarez and Rubio, 1989), and age of the chickens (Acar et al., 1995) play an important role to determine the production performance of the bird at the marketing age.

Leg problems in broiler have been attributed to several causes, including genetic and nutrition (Sullivan, 1994), speed of growth and imbalance between body weight and bone development (Julian, 1998). Feed restriction have been used to reduce growth rate and, consequently muscle weight and leg problems, but if quantitative feed restriction is used, the concentration of microelement essential for bone development may be lower than the requirements and increases the problem (Edwards Jr., 2000).

This paper describes experiments which were carried out to assess the optimized age to apply quantitative feed restriction + microelement supplement to control mortality from ascites and leg problems with no negative effects on production performance of broilers at the end of the growing period.

Experimental Procedures

The study was carried out in the Experimental Unit of the Colegio de Postgraduados, Montecillo, State of Mexico and located at an altitude of 2,240 m. from January until September 2001. Three groups of 1,200 mixed-sex one-day-old Ross x Peterson chick from a commercial hatchery were randomly allocated to one 2.5 x 2.00 m floor pens of 50 chicks each reared on oat straw litter for seven weeks.

All groups were fed with starter (from 1 to 28 d), and finisher (from 29 to 49 d) commercial feed based on sorghum and soybean meal ; water was provided ad libitum, and incandescent light was used to provide 24 h of light throughout the growth period. At different ages, (21 or 28, 14 or 21 and 7 or 14 d of age) a quantitative feed restriction program was applied 8 h/d for 14 d raising the feeders at 0800 h and lowering at 1600 h. In Experiment 2, a 10% of commercial premix of microelements was mixed with the available feed; results on body weight gain and feed conversion showed negative effects due to the supplement; therefore in Experiment 3 it was reduced to 5%. In all the experiment a group was fed ad libitum and used as the control. The variables considered at the end of each experiment were body weight gain, feed conversion, total mortality, mortality from ascites and leg problems. The data were analyzed by the GLM procedure of the SAS software (SAS Institute, 1994).

Results of the Experiment 2 and 3 are summarized in Table 1. In Experiment 1 body weight gain and feed conversion were significantly lower in the restricted groups ; mortality from ascites decreased 2.33 and 1.59%, but leg problems increased 15.25 and 16.88% at 21 and 28 d of age respectively. These results indicated that the age at which quantitative feed restriction was applied was no appropriated and give rise to a deficiency of essential microelements for bone development. In Experiment 2 and 3, body weight gain and feed conversion improved in birds restricted at an earlier age, but decreased in those that received the

supplement ; mortality from ascites decreased in feed restricted bird, and was lower when the birds were restricted at 7 d of age with microelement supplements. In all the experiments, leg problems increased in the restricted groups without the microelement supplement.

Table 1 Least square means for weight gain (WG), feed conversion (FC), total mortality (TM), mortality from ascites (AM), and leg abnormalities (LA), of mixed[2]-week-old broilers under feed restriction[1] + microelements[3] at different ages. Experiments 2 and 3.

	Production variables				
Treatments	WG (g)	FC	TM (%)[3]	AM (%)[3]	LA (%)[3]
Experiment 2					
Control (1)	2,307	2.13	16.46	11.67	4.58
Restriction at 14 d without supplement (2)	2,304	1.99	10.94	7.56	6.67
Restriction at 21 d without supplement (3)	2,236	2.06	13.54	8.68	9.17
Restriction at 14 d with supplement (4)	2,247	2.12	17.89	10.83	3.33
Restriction at 21 d with supplement (5)	2,160	2.21	13.96	9.52	6.67
Experiment 3					
Control (1)	2,322	2.31	12.71	7.29	2.71
Restriction at 7 d without supplement (2)	2,356	2.15	7.50	4.79	3.54
Restriction at 14 d without supplement (3)	2,284	2.19	8.33	4.17	8.96
Restriction at 7 d with supplement (4)	2,322	2.14	4.58	2.92	1.46
Restriction at 14 d with supplement (5)	2,254	2.27	5.83	3.13	3.13

[1] h/d during the restriction period.
[2] Supplement = 10% and 5% microelement content of the diet.
[3] Percentages transformed into arc sine $\sqrt{p}$.

The results showed that feed restriction at 7 d of age for a period of no more than 14 d allows chickens to show the required compensatory growth to equal the live weight of non-restricted chickens. Acar et al. (1995) reported similar results on birds restricted at 7 d to 14 d of age ; however also reported that the birds restricted from 4 d to 11 day of age had the lowest final body weight, which possibly would indicate a lowest physiological limit for feed restriction. Total mortality and mortality from ascites decreased significantly as a result of feed restriction and 5% of supplement (Experiment 3). Leg problems showed an inverse relationship with age of restriction ; increased significantly by effect of feed restriction, but decreased with supplement, which could be explained because of a deficiency of essential microelements for bone development during the restriction period. Edwards Jr. (2000) points out that broilers feed diets with lower concentration of vitamins, minerals and amino acids less than requirements can be more susceptible to leg problems and recommends the use of quantitative feed restriction as long as Ca and P are adequately balanced or in excess.

The results indicated that mortality from ascites and leg problems of broiler could be reduced with quantitative feed restriction at 7 d of age with a microelement supplement that compensate those microelements that the birds do not consume during restriction ; moreover, early restriction permits a compensatory growth response of the restricted chicken to reach the production performance of the non-restricted at 49 d of age ; none the less, further research is needed on the subject.

REFERENCES

Acar, N., F. G. Sizemore, G. R. Leach, R. F. Wideman, Jr., R. L. Owen, and G. F. Barbato, 1995. Growth of broiler chicken in

response to feed restriction regimens to reduce ascites. Poultry Sci. 74:833-843.

Camacho, E., M. A., and M. A. Suárez O., 1996a. Relación entre enfriamiento y altitud durante la incubación y ascítis. Pag. 9 in: Reunión Nacional de Investigación Pecuaria Morelos 1996; Cuernavaca, Morelos, México.

Camacho, E., M. A., and M. A. Suárez O., 1996b, Características del cascarón de huevo y su relación con ascítis. Pag. 10 in: Reunión Nacional de Investigación Pecuaria Morelos 1996; Cuernavaca, Morelos, México.

Edwards, Jr., H. M., 2000. Nutrition and skeletal problems in poultry. Poultry Sci. 79:1018-1023.

Julian, R. J., 1998. Rapid growth problems: ascites and skeletal deformities in broilers. Poultry Sci. 77:1773-1780.

Leeson, S., J. D. Summers, and L. J. Caston, 1992. Response of broilers to feed restriction or diet dilution in the finisher period. Poultry Sci. 71:2056-2064.

Leeson, S., L. Caston, and J. D. Summers, 1996. Broiler response to energy or energy and protein dilution in the finisher diet. Poultry Sci. 75:522-528.}

McGovern, R. H., J. J. R. Feddes, F. E. Robinson, and J. A. Hanson, 2000. Growth, carcass characteristics, and incidence of ascites in broilers exposed to environmental fluctuations and oiled litter. Poultry Sci. 79: 324-330.

Ruiz-Feria, C. A., M. T. Kidd, and R. F. Wideman, Jr., 2001. Plasma levels or arginine, ornithine, and urea and growth performance of broilers fed supplemental L-arginine during cool temperature exposure. Poultry Sci.. 80: 358-369.

SAS Institute, 1994. SAS/STAT User's Guide. Release 6.08 Edition. SAS Institute Inc., Cary, NC.

Suárez O., M. E., and M. Rubio R., 1989. Uso de restricción alimenticia como control parcial del síndrome ascítico. Vet. Méx. 20:193-195.

Sullivan, T. W., 1994. Skeletal problems in poultry: estimated annual cost and descriptions. Poultry Sci. 73: 879-882.

Wideman, Jr. R. F., Y. K. Kirby, M. Ismail, W. G. Bottje, R. W. Moore, and R. C. Vardeman, 1995. Supplemental L-arginine attenuates pulmonary hypertension syndrome (ascites) in broilers. Poultry Sci. 74:323-330.

For further information on this research, feel free to contact:

Maria Elena Suarez Oporta, Ph.D.
Colegio de Postgraduados
km 36.5 Carretera Mexico-Texcoco,
26230 Edo. de Mexico
Mexico
E-mail: **chontal@colpos.mx**