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Effect of Nipple Type Drinker Height on Productive Parameters of Broilers

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Abstract: The effect of two nipple drinker heights on productive parameters and mortality of broilers up to day 42 was assessed. Birds were subjected to two treatments: 1) low height (the bird stretches the neck and drinks on the side of the beak); and 2) at a high level (the bird stretches the neck, pushing its chest upward and drinks with the point of the beak). Height was adjusted twice per week by visual observation of the birds at drinking time and observation of bedding level homogeneity in each experimental unit. Each treatment had 5 repetitions with 7 birds each one, handling and lodging followed broiler rearing recommendations, photoperiod was natural and water temperature was maintained at the recommended range (17 and 20 EC). Variables that were recorded each week were: feed consumption, body weight, feed conversion and mortality. The data analysis showed only numeric differences for the productive parameters, although accumulated mortality was 11.4% for the lower treatment and 25.7% for the higher one (P<0.10 Also, accumulated water consumption average per treatment per bird was 10,32 L for the low treatment and 9.621 L for the high treatment. Results suggest that the height of the nipple does not affect productive parameters, nevertheless it is an important factor to guarantee the amount and quality of water that is taken in to achieve maximum yield of poultry.

Key words: Broilers, drinkers, nipple height

INTRODUCTION

Water is considered by certain authors as one of the most important nutrients of the diet (Lesson and Summers, 2005; Cuca *et al*., 2009; Quintana, 2011), nevertheless it tends to be the most ignored aspect of commercial poultry production. Water is important, since it intervenes in indispensable physiological and biochemical mechanisms of living organisms. It is also considered a vital element that must be administered to birds in the proper amount and quality to comply with its functions.

Currently, there are several drinking water supply systems and amongst them the nipple drinker has become especially interesting for the poultry industry, as for example in the United Kingdom where it is used 54.3% of the time (Jones *et al*., 2005), even though these modern systems alter poultry ethology when drinking water (Houldcroft *et al*., 2008), since the birds are forced to apply pressure to the nipple with their beaks in order to obtain the water (Appleby *et al.,* 2004). Nevertheless, the main justification for the application of nipple systems in countries with technically developed poultry industries such as the United States or the European Union has been savings in labor by eliminating the task of bell drinker's cleaning (Goan, 1994). Likewise, when comparing it with the traditional drinker, the nipple facilitates humidity control of the bedding (Ipek *et al*., 2002), as well as improves the microbiological quality of the water (Macari and Amaral, 1997; Valias and Silva, 2001). These factors may have a positive effect on poultry productivity (Amaral, 2004).

Nipple drinkers require three basic handling aspects, height of the line above the bedding, pressure and water flow (ml/min), that must be adjusted according to the age and size of the birds (Penz and Viola, 2004).

There are several researches on the application of nipple type systems and their effect on the birds and their yield (Houldcroft *et al*., 2008; Bruno *et al*., 2011). Lott *et al.* (2001), reported that the height of the nipple may reduce weight gain in poultry; yet feed consumption, feed conversion and mortality are not affected (Lott *et al.*, 2001; Ipek *et al*., 2002). Also, nipples at a higher level reduce water consumption, situation that has a more acute effect when birds are exposed to temperatures above 32E (May *et al*., 1997). When water flow is below 25 ml/min, feed consumption is reduced (Dozier, 2003) caused by lower water consumption; in contrast, an optimum water flow (138 ml/min) guarantees an efficient weight gain (Carpenter *et al*., 1992).

With this background, the objective of this study was to compare the effect of two nipple type drinker heights on productive parameters and mortality of Ross 308 broilers.

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MATERIALS AND METHODS

The study was carried out in the experimental henhouse at the Departamento de Medicina y Zootecnia de Aves of the FMVZ of the Universidad Nacional Autónoma de México. Seventy, Ross 308 line, one-day-old males, with an average weight of 47 g, that came from a 37 weeks of age breeder lot were used.

Two different line height nipples treatments were evaluated: T1 or low (the bird stretches the neck and drinks on the side of the beak); and T2 or high (the bird stretches the neck, elevates the chest and drinks with the tip of the beak). The height of the drinker was measured from the lower border of the nipple to the bedding surface and was adjusted twice a week based upon visual observation (Table 1), taking care that the level of the bedding was equal all around. Each treatment had 5 repetitions with 7 chickens each one.

Table 1: Nipple height (cm) at different ages

Age (days)	Nipple drinker height	
	Low	High
1	10	12
7	15	17
14	20	23
21	25	29
28	29	36
35	33	39
42	39	42

The lodging and handling program was carried out according to established practices and under well-being conditions that comply with the Mexican Official Standard NOM-069-ZOO-1999.

The birds were kept until the 42nd day of age, in housing with natural environment, isolated roof, wood shavings as bedding material, natural lighting program and the birds received warmth by means of infrared light during rearing (0-21 d), then they were kept at environmental temperature.

Feed and water were provided *ad libitum, in mini* hopper feeders during initial stage (0-7 d) and after that in hopper feeders. Commercial feed was provided for three phases (initiation, growth and finishing) according to the recommendations of the manufacturer. The experimental unit was a Lubbing® brand nipple with cup and the line of drinkers maintained a flow of 60-130 ml/min depending upon the age of the birds.

Variables were evaluated weekly and these were body weight (BW), feed consumption (FC), conversion index (CI) and mortality (M), this last one was corrected with the arcsine function for statistical analysis. Also, with the purpose of guaranteeing the veracity of data, accumulated average values of water consumption, body weight variation coefficient (CV) and tarsus length of all the birds of each treatment were assessed per week, and carcass yield of 15 birds was established at the end of the experiment.

Statistical analysis of productive parameters and mortality was carried out with the statistical program SPSC 18.0, resulting means were subjected to variance analysis and t- Student test with a significance level of 5%.

RESULTS AND DISCUSSION

The results that were obtained indicate that there were no significant differences between treatments for the productive parameters (Table 2). Weight gain indicates a numeric difference in favor of the low treatment, which coincides with what Ipek *et al*. (2002) reported indicating no statistical difference found when using three different nipple heights; Lott *et al.* (2001) on the other hand reported higher weight gain for the lower height but it must be taken into consideration that the height used for those higher treatments was much higher than what was applied in this experiment. The CI results indicated a tendency ($P<0.10$) for a better CI, with 1.68 in the low treatment and 1.77 in the high one, data that coincides with what was obtained by Ipek *et al*. (2002), who, similarly to this experiment evaluated the effect of nipple height in male chicks of up to 42 days of age; also, there are several researches that indicate that the application of nipple systems may improve feed conversion (Carpenter *et al.*, 1990; Goan, 1994).

Results such as FC and daily weight gain did not indicate significant differences coinciding with Lott *et al*. (2001) and Ipek *et al*. (2002), nevertheless there were numeric differences in favor of the low treatment.

Accumulated average water consumption per treatment and per bird was 10.32 L in the low treatment and 9.62 L in the high one, which suggest that a there is a higher water consumption with the low nipple. May *et al.* (1997) indicated that when the birds had more difficulty in drinking from the very high nipples, they limited their water consumption, which directly limited feed consumption (Chamblee *et al*., 1989); yet this was not observed in this experiment since the high treatment was not excessively high as to affect water consumption.

Table 2: Effect of nipple type drinker height on productive parameters, carcass yield, weight variation coefficient and tarsus length in 42 days-old broilers

Parameter	Tr. 1 Low	Tr. 2 High
Body Weight (Kg)	2.776	2.719
Accumulated Feed Consumption (Kg)	4.342	4.357
Conversion index	1.68	1.77
Accumulated mortality (%)	11.43	25.71
Body weight variation coefficient (%)	6.34	8.01
Tarsus length (cm)	10.49	10.39
Carcass yield (% of live weight)	67.00	66.00

Tr. = Treatment

When evaluating accumulated mortality, a higher level was observed in the high treatment (25.71% vs 11.43%) with a tendency of ($p<0.10$), being noteworthy that the most frequent mortality cause was an ascites syndrome, although it is unknown if the effect of nipple height could have been the direct cause of this.

General evaluation of body weight VC of each treatment indicates that there isn't great difference, yet the best VC was 6.34% in the low treatment vs. 8.01% in the high one. Noteworthy is the fact that both values are within the excellent category (Bell and Weaver, 2002; Cobb, 2008; Aviagen, 2009) and may be considered as of a "uniform flock" (Juarez, 2009). Tarsus length, at the end of the experiment, was similar between treatments and this coincides with what was reported by Quintana *et al*., 1998. Lastly, carcass yield (percentage of live weight) at day 42 was 67% and 66%, for the low and high treatments respectively. These values differ from what is reported by the genetic company (72 %) for birds under the same conditions; nevertheless, this difference is due to the fact that in this experiment yield was measured without skin. Also other researches do not report carcass yield differences in birds reared with nipple drinkers (Webeck *et al*., 1994).

In conclusion, nipple heights used in this experiment do not affect productive parameters of broilers; therefore, to define an appropriate height for nipple drinkers in commercial farms any of those applied in this experiment can be used. Nevertheless, good management practices shall be necessary for the comfort of the birds as well as good drinking water quality, amount and availability.

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