Use of Torula Yeast from Sugar Cane Molasses in White Leghorn Replacement Hens

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ABSTRACT

The use of Torula yeast from sugar cane molasses in the diet of White Leghorn replacement chicks L-33 was evaluated. Two hundred 15-20 week-old chicks were used in a completely randomized design, comprising 4 treatments (10 birds per cage). Torula rations were 0, 3, 6, and 9 g/animal/day in growing diets (105-112 days), and pre-laying diets (113-140 days, or at the end of the experiment), with 4 repetitions each. The results showed that at 0; 6 and 9 g/animal/day of Torula yeast, the productive behavior of the chicks was affected. Adding 3 g/animal/day of Torula yeast in the diet of White Leghorn L-33 replacement at the end of the growing stage, led to a higher productive behavior than in the rest of the treatments, similar indicators to their contemporary. Accordingly, identifying chicks with low weight, small size, and poor shape was made easier, and they could be returned to the production areas.

Keywords: *yeast, layer replacement, nutrition, sugar cane molasses*

INTRODUCTION

Today, layers are genetically able to begin production at an earlier stage. To achieve that goal, it is important that replacement birds reach proper live weight, size and general development at different growing stages, especially at the beginning of lying, according to the development of their bone structure (Bermúdez 2000; Bertechini and de Brito 2007).

Valdivie *et al*. (1982) demonstrated the possibility to include up to 20 % of Torula yeast from sugar cane molasses in the startup diets, until the 23rd week of age. Morales *et al*. (2000), using growing White Leghorn birds, reported better uniform development and higher production indicators with the administration of Torula yeast from sugar cane molasses in the diet.

Particularly, in commercial replacement layer hens, the Ciego de Ávila market demands chicks with adequate weight, tarsus and uniformity, in order to produce big and clean eggs with shells resistant to constant handling to the final consumer.

Regularly, the Ciego de Ávila Poultry Company returns large numbers of layer chicks to replacement farms because the birds are unable to adapt to nipples, with lower than the required weight, size and uniformity.

The purpose of this study is to evaluate the use of Torula yeast from sugar cane molasses in the diet of White Leghorn layer replacement chicks after being returned to the replacement farms.

MATERIALS AND METHODS

The experiment was performed at the Manuel Ascunce Domenech Basic Production Farm No. 4, in charge of replacement layer hens.

Two hundred White Leghorn replacement chicks (L-33), from 15-20 weeks of age, were used. A completely random design was used, at a rate of 10 replacement chicks/cage, with four treatments. The control group was made of their contemporary animals. The experiment included the administration of 0; 3; 6 and 9 g/animal/day of Torula yeast from sugar cane molasses in the diet at the end of the development stage, along with vitamins (A, D3, E, and B; pantothenic acid, nicotinic acid, folic acid, and vitamin B12), supplied in the drinking water at 2 mg/l.

The feeding system was applied according to the UECAN (2007) recommendations for development (63 in 112 days), and pre-laying (113 in 140 days, or at the end of the test).

The lighting requirements were met, according to the technical specifications for the stage.

Bird behavior was determined by weighing the birds the first day of the experiment (on the day the chicks arrived at the growing farm back from the laying farm). Then the vitamin complex and Torula were administered at a rate of 3; 6 and 9 g animal/day. The birds were weighed three times a week, and their tarsus, uniformity and conversion were measured in the same intervals. On transportation to the laying farm, new data were registered (age at first laying, laying per cent, egg weight, feed conversion, eggs and viability). The 100 and 5 000 g analytical balances

and vernier calliper, were used for measurements. Concerning the vitamins, the data were supplied by LABIOFAM (2014) (Table 1), and the feedstuffs factory in Cienfuegos (2014) (Tables 2 and 3).

Data normality verification using the Kolgomorov-Smirnov test showed that distribution was within the normal parameters. The data were processed by simple variance analysis in a completely random design to compare the variables according to the five treatments: the contemporary hens in the control group were compared with the rest of the group (0; 3; 6; 9 g/b/d of Torula yeast in the diet); the behavior of the main replacement chick indicators; and the indicators for egg production. Mean comparisons were determined by the Dunnett test ($P < 0.05$).

RESULTS AND DISCUSSION

The productive behavior of birds that received 3 g/a/day of Torula yeast from molasses was similar to their contemporary as to live weight, tarsus length, and uniformity and feed conversion. However, the 0; 6 and 9 g/animal/day treatments decreased live weight (Table 4). These results do not match the reports by Valdivie *et al*. (1982), who evaluated Torula yeast from molasses up to 20 %, at the onset of this bird category (0-9 weeks of age), and found no treatment effects on animal behavior. The detriment of other indicators, in the 6, and 9 g/animal/day of yeast may be related to the low nutrient retention observed from a 20 % yeast inclusion by Álvarez and Valdivie (1980), Tillán *et al*. (1986) and Rodríguez *et al*. (2011).

Pacheco *et al*. (2013) found a reduction of nutrient digestibility when thin particles were used. This was related to a discrete intestinal hypertrophy, caused by bacterial fermentation that somehow might affect bird appetite. A reduction in feed consumption in the 6 and 9 g/animal/day of yeast had an effect on live weight, as feed conversion was lower than the treatment with torula yeast and the 3 g/animal/day treatment. This behavior was determined by low feed (nutrients) consumption, which altered nutritional efficiency.

Several factors like feedstuff, water, vaccines, light, temperature, and transportation quality, have an influence on feed consumption (Pérez and López, 2004).

After insertion and during production, the age of first laying, the laying per cent, feed/egg conversion, egg weight and viability, were not affected in the 3 g/animal/day treatment with Torula yeast from sugar cane molasses in the diet (Table 4). Meanwhile, the birds in the 6 and 9 g/animal/day yeast treatment showed much lower indicators, than for the 3 g/animal/day treatment. The live weight values were lower than the 95 % set up standard (1 420 g/bird). Hidalgo (2007) said that birds under their required live weight for that stage will probably stay like that for the rest of their growing cycle, with a very discrete production of eggs, which has been corroborated in this paper.

Kawakkel *et al*. (1997) noted how important it is for the chicks to reach their required live weight at twelve and sixteen weeks of age, since in that stage, weight depends on bone and organ development, which will later be in charge of egg production. Likewise, Rodríguez (1989) and Bermúdez (1997) suggested that chicks must have 95 % of bone growth in twelve weeks, if the goal is to achieve optimum weight and sexual development by the 18^{th} week of age.

The results show that 6 and 9 g/animal/day of yeast from sugar cane molasses in the diet of birds affect the productive behavior (Butolo, 1991 and Perdomo*et al*., 2004). The possibility to include up to 3 g/animal/day of Torula yeast from sugar cane molasses in the diet of White Leghorn L-33 replacement hens, contributes to recovering low-weight and size, and poorly uniformed chicks, and re-insert them back in the layers farm. It is an alternative to rescue around 8 000 birds per stock, with a productive response very similar to their contemporary (Table 5), which is fundamental for egg production, accounting for CUP $70 000. It would be a cost effective solution for this bird category, considering the 3 g/animal/day treatment costs CUP $0.28.

CONCLUSIONS

The addition of 3 g/animal/day of Torula yeast from sugar cane molasses can help send 8 000 low weight and tarsus, and poorly uniformed chicks per stock, back to the egg production farms.

The birds recovered reach the same productive results as their contemporary.

As a result, the chicks put back to production represent CUP $ 70 000, thus contributing to cost effectiveness in terms of replacement. The cost of recovery is CUP $ 0.28 per bird.

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Table 1. Contribution of different vitamins in 1 kg of the feedstuff

Vitamins	Content 1 kg
Vitamin (IU)	11.5
Vitamin D3 (IU)	3.3
Vitamin E (mg)	24.0
Vitamin B (mg)	2.5
Pantothenic acid (mg)	12.0
Nicotinic acid (mg)	37.0
Folic acid (mg)	0.98
Vitamin B 12 (μg)	26.0

Table 2. Composition and contribution to development diets (105 - 140 days) on humid base

Ingredients %	Torula yeast from sugar cane molasses			
	0	3	6	9
Corn meal	59.000	56.000	53.000	50.000
Soy bean meal	25.070	25.070	25.070	25.070
Plant oil	0.800	0.800	0.800	0.800
Wheat bran	10.000	10.000	10.000	10.000
Torula yeast	0.000	3.000	6.000	9.000
Salt	0.360	0.360	0.360	0.360
Methionine a	0.040	0.040	0.040	0.040
F. Monocalcium	1.700	1.700	1.700	1.700
Calcium carbonate	1.900	1.900	1.900	1.900
Colina	0.130	0.130	0.130	0.130
Pre-feedstuff mixture 1	1.000	1.000	1.000	1.000

Table 3. Nutrient contribution to developing diets (105 - 140 days) on dry base

Nutrients	Estimated contribution %			
	0	3	6	9
EM, MJ/kg	12.03	12.04	12.03	12.03
PB	17.91	18.48	18.79	18.84
Methionine+cysteine	0.64	0.64	0.64	0.64
Calcium and phosp-horous	2.99	2.6	2.4	2.3

Table 4. Effect of torula yeast from sugar cane molasses on production indicators of layer replacements (15 to 20 weeks of age)

Indicators	Torula yeast from sugar cane molasses				*ET+/-*
	0	3	6	9	
Live weight (g)	1 128a	1 328b	1 037c	1 024c	24.03
Tarsus length (mm)	101b	103a	101b	101b	0.08
Uniformity (%)	86.7b	93.6a	850b.	84.9b	2.02
Feed conversion (kg)	3.62b	3.08a	3.98c	3.99c	0.07

abc Unequal letters in the same row differ significantly Dunnett ($P < 0.05$)

Table 5. Behavior of recovered chicks using torula yeast from sugar cane and vitamins in production indicators after laying again (25 to 52 weeks of age)

Indicators	Torula yeast from sugar cane molasses					ET+/-
	0	3	6	9	C	
Age at first egg (d)	153b	128a	144b	147b	124a	0.987
Production Laying %	70.6b	77.4a	72.9b	71.8b	77.8a	0.530
Feed/egg conversion kg	1.60b	1.45a	1.57b	1.58b	1.44a	0.004
Egg weight (g)	53.2	56.0	53.3	52.9	55.8	0.123
Viability(%)	68.9b	73.1a	68.4b	67.8b	72.3a	0.124

C: contemporary

abc: Unequal letters in the same row differ significantly Dunnett ($P < 0.05$)