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Performance of Santa Inês/Dorper Lambs Fed with Live Yeast Concentrate

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Abstract

Due to the development of the Brazilian sheep breeding, new alternatives for animal feeding, in order to increase gain and economic result of the production, were required. The present paper intends to evaluate the effect of the addition of live yeast concentrate (LYC) on Santa Inês/Dorper lambs diet, in the growth performance. For this purpose, 16 weaned lambs were used, divided in two groups (Yeast X Control) which received both the same feed and sanitary management, although the group yeast has received 2g of LYC/an.day. The effect of LYC was significant and positive for average daily gain (Yeast = 214.0g/day X Control = 194.8g/day).

Keywords: Live Weight Gain; Feed additive; Growth; Yeast concentrate; Animal feeding; probiotics; Nutrition; Saccharomyces cerevisiae; Jeopardizing human; Fibrous fraction; Starch; soluble carbohydrates; Feeding strategy; Dorper lambs; Ruminal pH

Introduction

The market for sheep meat is growing in Brazil. It became necessary to determine the more appropriate technical management according to Brazilian's conditions. Feed efficiency is an important variable, is not enough simply select animals with higher weight gain: they must be as efficient as possible for feed consumption and performance [1].

Nutrition is the main factor for good performance and cost production, so any strategies to increase the use of nutrients by animals is important [2]. One of the most used strategies is adding probiotics to animal's diet to improve live weight gain efficiency without altering carcass characteristics or jeopardizing human or animal health. However, the results are still very inconstant [3].

Among probiotics, *Saccharomyces cerevisiae* has been showing to be a viable alternative to be used for ruminants. However, even with several published studies, little is known about the mechanism of action, since the effects are very inconstant and depend on the additive dosage and diet composition [4].

Tricarico review [3] reports increase in productivity (meat or milk) associated to the use of live yeast cells (LYC) of *Saccharomyces cerevisiae*. According to Hopkins D & Newbold et al. [5,6] it happens because yeast stimulates the proliferation of total anaerobic bacteria, cellulolytic bacteria and lactate-consuming bacteria in the rumen, leading to changes in metabolism and improving digestive process of the diet's fibrous fraction.

Saccharomyces cerevisiae and its related species and strains are the most known and highly commercially used yeasts. However, little is known about its use on sheep's diet. Its use has become widespread among breeders but has been based on inferences on bovine data [7]. The goal for presenting this paper is helping to clarify these questions

Materials and Methods

Table 1: Composition of the diet offered to the animals in ingredients and nutrients. as % of dry matter (DM).

Ingredients	% of DM
Sorghumsilage	55
Ground corn grain	28
Soybean meal	16
NaCl	0.5
Mineral e vitamins[1]	0.5
NUTRIENTS	**% of DM**
Crude protein (CP)	14.7
Neutral detergent fiber (NDF)	32.9
Ether Extract (EE)	4.1
Ashes	8.2
NFC[2]	38.6

[1]Minerais and vitamins: Ca 14.5%. 11.6 P. 2.8% Mg. 2.8% S. 220ppm CO. 6000ppm of Mn; 10.000ppm Zn. 90ppm Se . 180ppm of I; 1.000.000IU/kg Vit. A; 250.000 IU/kg Vit.D. 2250 IU/kg Vit. E

[2]NFC - non-fibrous carbohydrates = 100 - (CP + NDF + EE + ash).

An experiment was performed using 16 weaned lambs, half blood SantaInes/Dorper, at Green lamb Farm ,Araruama County, Rio de Janeiro State, Brazil. The weaning lambs were randomly divided into 2 groups of 8 animals each (T0- control and T1 - Yeast). The trial lasted five months, when the animals were confined getting the same sanitary and feed management (diet is described in Table 1). The T1 group animals received 2g daily of Biosaf® commercial product constituted by 10x109CFU/g live *Saccharomyces cerevisiae* strainSc47.Treatments were arranged in a completely randomized design with eight replication sand analyzed according to the model:

$$Yij = m + Ti + eij$$

Where,

Yij =observation for animal receiving treatment i,

m =overall constant;

Ti =effect of treatment I,

eij =random error to each observation

The animals were weighed weekly, in the morning. The facilities presented concentrate trough, manger, water trough and a sunbathing area. The average live weights of the animals, at the beginning of the experiment, was 17.8kg and 17.6kg for Yeast and Control group respectively.

Results and Discussion

Table 2: Live weight (kg) and weight gain (g) per animal per day (ADG).

Weighing		1st	2nd	3rd	4th	5th	6th	7th	8th	Average
Yeast Group	ADG	160.1	183.1	203.9	230.1	253.2	275.9	197.5	208.1	214.0[a]
1	Weight	17.8	20.3	22.7	25.6	28.1	30.7	32.9	34.7	
Control Group	ADG	158.0	182.0	197.6	211.1	229.7	243.1	166.5	170.3	194.8[b]
2	Weight	17.6	20.2	22.0	23.5	25.5	27.0	27.8	32.8	
1-2		0.2	0.1	0.7	2.1	2.6	3.7	5.1	6.3	

Same letter do not differ statistically by Tukey test (p≤0.01).

Both live weight evolution and daily weight gain data are presented in Table 2. By analyzing them, it can be observed that the effect of using LYC was significant and positive with average daily gain of 261.5g versus 192.2g of the Control group.

The weight gain and final weight of Yeast group animals are similar to those found by Baungartner (2001) cited by Rosanova [8] & Barros [8,9] who found values of 214.0g/day and 182.4g/day ±11.9g/day respectively. Castillo Estrada et al. [10] had tested 80 male sheep using 1.5 to 2.5g of LYC/an.day and found the average daily gain respectively 38.5% and 77.5% higher than Control group. Dawson's review [11] reported increased responses in average weight gain ranging from 8.7% to more than 20%.

Table 3: Daily intake and feed conversion of animals during experiment.

Parameter	With Yeast	Control
Dry Matter intake/ Live Weigh (%LW)	3.38 ± 0.22[a]	3.16 ± 0.20[b]
Feed Conversion	2.64 ± 015[a]	3.21± 0.12[b]

Means followed by the same letterdo not differ by Wilcoxon test (p<0.05)

The results obtained at this present paper were, possibly, due to higher dry matter intake observed in Yeast group animals (3.38% LW) compared to Control group (2.64% LW). Similar data was observed by Furosho-Garcia [12]. Several authors [13-17] have found higher values in dry matter degradation due to inclusion of LYC in ruminant's diets and this has been suggested as the factor that justifies the higher dry matter intake associated with the use of yeast.

The mechanism of the yeast action in ruminants is not quite clear. Some studies suggested that the beneficial effect seems to be associated with the yeast presence which should stimulate both bacterial growth and cellulolytic activity, thus increasing ruminal fiber degradation, the flow of microbial protein to the small intestine and consequently animal production [6,15,17,18].

Although dry matter degradation has not been evaluated at the experiment, performance results obtained are consistent with those found by Carro & Fiems et al. [19,20] testing lambs fed with highly starch and soluble carbohydrates diets (HSSCD) compared to those fed with base diets and concluding that greater effect of yeast addition on ruminal pH and microbial growth and activity were experienced on group receiving HSSCD.

Santos et al. [21] emphasized that the beneficial effect of yeast occurs only with high soluble carbohydrates diets and highly digestible cell wall diets due to enhances on ruminal environment. However, several factors can affect animal performance response to supplementation with yeast, specially the presence of factors causing stress, desired production level, stage of animal development, type of forage, feeding strategy,

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roughage-to-concentrate ratio in the diet [22,23] and diet quality [24].

Neumann [25] found lower feed conversion for lambs fed with high concentrate diet and supplemented with 0.8g/day of *Saccharomyces cerevisiae*. In this case, the beneficial effects of yeast were not sufficient to prevent the occurrence of digestive disorders such as subclinical rumen acidosis. So, the author adds another variable to the previous list: yeast dose and viability.

When using roughage base diets the results are discordant. Some studies have shown increased microbial synthesis and in vitro degradability while others found no effect [26].

Conclusion

The use of 2g of live yeast concentrate with $10x10^9$ provided better performance to ½ blood Santa Inês/Dorper lambs after weaning, and thus reducing the interval from birth to slaughter.

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