

EFFECT OF PROBIOTICS ON THE USE OF MASH DIETS WITH
HIGH AND LOW ALFALFA MEAL CONTENT IN RABBITS

Duilio Nieves-Delgado and Arturo Pró-Martínez

José Herrera-Haro and José Espinoza Velázquez.

Centro de Ganadería, Colegio de Postgraduados

Montecillo, Edo. de México C.P. 56230

Abstract

The objective of this study was to evaluate two commercial probiotics Bioyeast (BY*) and Lacto-Sacc (LS**) in two different mash diets on enteritis manifestation, mortality, body weight gain, feed consumption and feed conversion in rabbits. One hundred and forty four weanling rabbits of mixed sexes were assigned to nine treatment (n= 16), according to a randomized complete-block design with a factorial arrangement. Two mash diets and four levels of probiotics plus a control were studied. The treatments evaluated were: 1) 54% alfalfa (A) plus 2% sorghum (S); 2) 1 plus BY; 3) 1 plus LS; 4) 1 plus BY+LS; 5) 20% A plus 35% S; 6) 5 plus BY; 7) 5 plus LS; 8) 5 plus BY+LS; 9) Pelleted commercial diet. There were no differences (P>.05) between treatments in any of the variables studied. It was found that rabbits that consumed the diets with high content of alfalfa did not show mortality or diarrhea, contrary to those rabbits that received the low alfalfa and high sorghum diets. Rabbits in treatment 8 showed 18.8% of diarrhea incidence and these rabbits died (3/16). Rabbits in treatments 5, 6 and 9 only presented diarrhea 18.8, 6.3 and 12.5% respectively. Neither mortality nor diarrhea were observed in those rabbits that consumed LS. These data suggest that both probiotics had a good effect in controlling diarrhea and mortality, especially with diets low in alfalfa and high in sorghum.

Introduction

In Mexico, the rabbit production has had a very poor development; different aspects have been implicated on this, one of them is the high cost of commercial feeds and its doubtful quality. It is known, that it is possible to include high levels of alfalfa (up to 90%) in rabbit's diets without affecting the growth rate (Harris et al., 1981). In contrast, high levels of non-structural carbohydrates in the rabbit's diet produce enteritis (Cheeke and Patton, 1981); also, the latter type of diets are more expensive.

*Bioyeast. Live Saccharomyces cerevisiae with the grown media encapsulated. Farmatec Laboratory Guadalajara, Jal. México.

**Lacto-Sacc. Dried S. faecium fermentation product, dried L. acidophylus fermentation product, yeast culture (live S. cerevisiae grown on a media ground yellow corn, diastatic malt and cane molasses), dried A. orizae fermentation extract, dried A. niger fermentation extract. Alltech Inc. Nicholasville, KY. USA.

Recently, it has been reported that probiotics offer a good possibility in controlling enteritis in rabbits (Cheeke *et al.*, 1989), however, the information available is limited. The objective of this study was to evaluate two commercial probiotics Bioyeast (BY) and Lacto-Sacc (LS) in two different mash diets on enteritis manifestation, mortality, body weight gain, feed consumption and feed conversion in weanling rabbits.

Materials and Methods

One hundred and forty four New Zealand weanling rabbits of mixed sexes, 42 days old, with an initial body weight of 1181 ± 170 g ($X \pm SD$), were assigned to nine treatment groups ($n=16$), according to a randomized complete-block design, with a factorial arrangement plus a control, where the main factors were the level of alfalfa (A) in the diet (54% A vs 20% A) and the type of probiotic included (none, BY, LS and BY+LS). A pelleted commercial diet was included as a control. The treatments were: 1) 54% A plus 2% Sorghum (S); 2) 1 plus BY; 3) 1 plus LS; 4) 1 plus BY+LS; 5) 20% A plus 35% S; 6) 5 plus BY; 7) 5 plus LS; 8) 5 plus BY+LS; 9) Pelleted commercial diet.

The composition of the experimental diets is shown in table 1. All diets were isocaloric and isoproteic, regardless of the difference in alfalfa and sorghum. Probiotics were included alone or combined in a proportion of 1g/kg and 2g/kg of feed 90% dry matter for BY and LS respectively. Each experimental diet was offered to four replicates of four animals each. Rabbits were housed in wire cages 90 x 60 x 40 cm in a naturally ventilated building. Feed and water were provided *ad libitum* in a circular feed trough and in automatic drinking trough respectively. At the end of each week, feed intake and body weight gain were recorded, while mortality and diarrhea incidence were recorded daily. The data were subjected to an analysis of variance procedure according to Steel and Torrie (1960).

Results and Discussion

The results of feed intake, daily gain, feed conversion and diarrhea are shown in tables 2, 3, 4 and 5 respectively. There were no differences ($P > .05$) between treatments due to main effects or interactions. In figure 1 it can be seen that those rabbits that consumed treatment 5 showed a tendency to have a lower daily gain rate. Also it is shown the initial and final body weight of the rabbits from the different treatments. The results of mortality are not presented in a table due to only 3/16 rabbits of treatment 8 died. Those rabbits that received a high alfalfa meal diet did not show mortality or diarrhea; on the other hand, the highest incidence of these variables occurred in those animals that consumed low alfalfa meal diets. It is important to observe that rabbits in treatments 5 and 8 showed a tendency to present more diarrhea incidence (18.8% both), and treatment 7 which included LS did not have any problem; in treatment 6 with BY only one rabbit showed diarrhea (6.3%). Accumulation of cecotropes on the floor of the cages was not observed as it was previously reported by Cheeke *et al.* (1989). The rabbits that consumed the

commercial diet (9) also suffered diarrhea (12.5%). It is clear that both probiotics produced good results in terms of controlling diarrhea and mortality in diets with high content of sorghum, probably by improving its intestinal microbial balance. One important observation of this study, was that both probiotics together produced the worst results, against what it was expected, probably due to different metabolic activities in the rabbit's digestive tract. Another important point is that both probiotics did not have any effect with the diet high in fiber (treatments 1, 2, 3 and 4) these results suggest, as reported previously, that the diet's composition had a major effect on the rabbit's enteritis manifestation.

Conclusions

The composition of the diets had a major effect in diarrhea incidence and mortality, but according to these data, inclusion of BY or LA helped in controlling these effects. No significant differences were observed in feed consumption, body gain and feed conversion between treatments.

References

- Cheeke, P.R. and N.M. Patton 1981. The Rabbit: An emerging livestock species. *Feedstuffs*. April 13, 1981. 23-26.
- Cheeke, P.R.; A.G. Hollister and K.L. Robinson 1989. Improving feed efficiency and reducing mortality in rabbits: a case study for use in all species. *Biotechnology in the feed Industry*. Proceedng of Alltech's fifth annual Symposium Alltech Technical publication 253-259.
- Harris, D.J.; P.R. Cheeke and N.M. Patton. 1982. Utilization of high alfalfa diets by rabbits. *J. Appl. Rabbit Res.* 4:30-34.
- Steel, G.D.R. and H. Torrie. 1960. *Principles and procedures of statistics*. Mc Graw Hill Co. 481 pp.

Table 1. Composition and analysis of experimental diets.

Ingredients	High Fiber	Low Fiber
	(%)	(%)
Alfalfa meal	54.00	20.00
Sorghum	2.60	35.30
Soybean meal	7.30	12.70
Wheat bran	20.30	25.33
Molasses	5.00	5.00
Sheep tallow	9.70	-
DL-Methionine	0.17	0.17
Lysine-HCL	0.03	-
Vitamin and mineral Premix	0.30	0.30
Dicalcium Phosphate	0.10	-
Salt	0.50	0.50
Limestone	-	0.70
DETERMINED COMPOSITION		
Dry matter, %	90.50	90.10
Digestible energy, Kcal/kg	2453.34	2629.12
Crude protein, %	19.30	19.70
Neutral detergent fiber, %	34.70	23.81

Table 2. Feed intake (g) of rabbits fed diets containing different amounts of alfalfa meal and sorghum with probiotics ($\bar{X} \pm SD$).

Diet composition	P R O B I O T I C S				\bar{X}
	Without	BY	LS	BY + LS	
54%A + 2%S	91 ± 11	96 ± 9	93 ± 7	94 ± 10	94.3
20%A + 35%S	88 ± 8	91 ± 5	91 ± 8	88 ± 6	89.3
\bar{X}	89	94	92	91	

Pelleted commercial diet= 105 ± 6

Table 3. Daily gain (g) of rabbits fed diets containing different amounts of alfalfa meal and sorghum with probiotics ($\bar{X} \pm SD$).

Diet composition	P R O B I O T I C S				\bar{X}
	Without	BY	LS	BY + LS	
54%A + 2%S	29.3 ± 5.9	30.5 ± 3.9	31.2 ± 3.3	30.9 ± 3.1	30.5
20%A + 35%S	25.7 ± 6.5	31.0 ± 4.0	30.3 ± 5.4	29.1 ± 5.2	29.6
\bar{X}	28.6	30.8	30.8	30.0	

Pelleted commercial diet = 26.7 ± 7.2

Table 4. Feed conversion of rabbits fed diets containing different amounts of alfalfa meal and sorghum with probiotics ($\bar{X} \pm SD$).

Diet composition	P R O B I O T I C S				\bar{X}
	Without	BY	LS	BY + LS	
54%A + 2%S	3.1 ± .32	3.1 ± .42	2.9 ± .25	3.1 ± .33	3.1
20%A + 35%S	3.4 ± .39	2.9 ± .25	3.0 ± .36	3.0 ± .39	3.2
\bar{X}	3.3	3.0	3.0	3.1	

Pelleted commercial diet = 3.9 ± .32

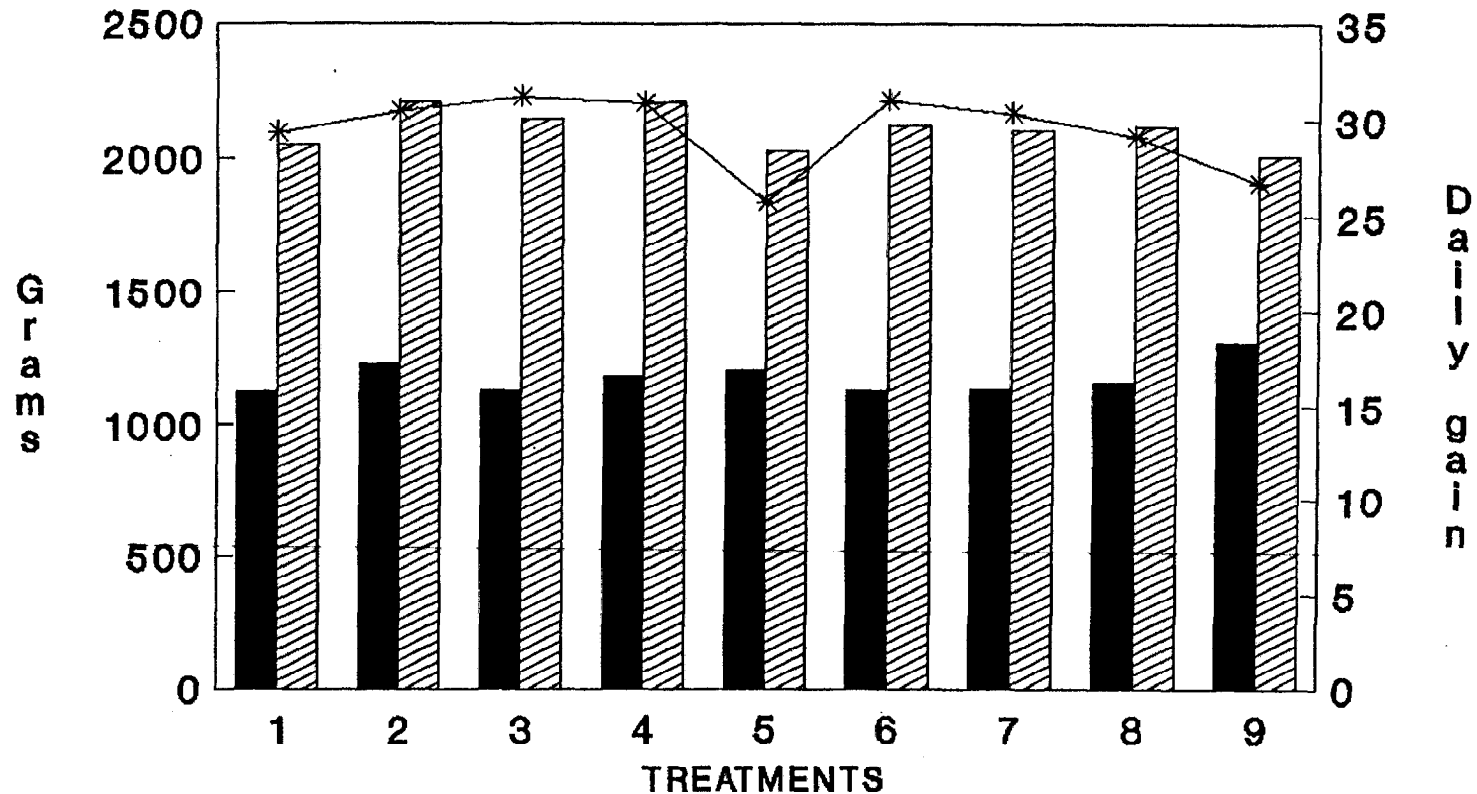
Table 5. Diarrhea incidence of rabbits fed diets containing different amounts of alfalfa meal and sorghum with probiotics (n; %).

Diet composition	P R O B I O T I C S				Total
	Without	BY	LS	BY + LS	
54%A + 2%S	0/16; 0.0	0/16; 0.0	0/16; 0.0	0/16; 0.0	0/64 0.0
20%A + 35%S	3/16; 18.8	1/16; 6.3	0/16; 0.0	3/16*; 18.8	7/64 11
Total	3/32; 9.3	1/32; 3.1	3/16; 0.0	3/32; 9.3	

Pelleted commercial diet = 2/16; 12.5

* All died

Figure 1. Average initial body weight, final body weight and body weight gain of rabbits fed the experimental diets, during 35 days.



Initial body weight
 Final body weight
 Daily gain

1) 54%A + 2% S; 2) 1 + BY; 3) 1 + LS; 4) 1 + BY + LS; 5) 20%A + 35%S;
 6) 5 + BY; 7) 5 + LS; 8) 5 + BY + LS; 9) CONTROL