WORLD RABBIT SCIENCE 1995, 3 (1), 15-18

EFFECT OF ORAL ADMINISTRATION OF YEAST (*SACCHAROMYCES CEREVISIAE*) ON DIGESTIBILITY AND GROWTH PERFORMANCE OF RABBITS FED DIETS OF DIFFERENT FIBRE CONTENT

CHAUDHARY L.C., SINGH R., KAMRA D.N., PATHAK N.N.

Animal Nutrition Division,
Indian Veterinary Research Institute, IZATNAGAR, 243 122 - India.

SUMMARY : Thirty two laboratory strain New Zealand White rabbits aged about 6 weeks were divided into 4 equal groups. Rabbits were fed diets of 9.73 % (/DM) fibre in group 1 and 2, and 12.86 % fibre in group 3 and 4. Yeast culture (*Saccharomyces cerevisiae*) at a rate of 5 x 10^8 cells /animal /day was given orally to group 1 and 3. Dry matter intake was significantly (P<0.01) higher in the rabbits given high fibre diet but the digestibility coefficients of dry matter, organic matter, ether extract, nitrogen free extract and feed conversion efficiency were significantly better in the animals given low fibre diet. Administration of yeast culture had no effect on weight gain or digestibility of nutrients.

RÉSUMÉ *: **Effet de l'administration orale de levure (Saccharomyces cerevisiae) sur la digestibilité et les performances de croissance de lapins recevabt des régimes à taux de fibre différents.***
Trente deux lapins de laboratoire de race Néo Zélandais Blancs âgés d'environ 6 semaines, ont été répartis en 4 groupes égaux. Ces lapins ont reçu des régimes contenant 9,73 % pour les groupes 1 et 2, et 12,86 % de cellulose brute (/MS) pour les groupes 3 et 4. La culture de levure (Saccharomyces cerevisiae), au taux de 5 x 10^8 cellules /animal/jour, a été donnée oralement aux groupes 1 et 3. La matière sèche ingérée était significativement (P<0.01) plus élevée chez les lapins recevant le régime le plus riche en fibre mais les coefficients de digestibilité de la matière sèche, de la matière organique, de l'extrait éthéré, de l'extractif non azoté, et l'indice de consommation étaient significativement meilleur chez les animaux recevant le régime le plus pauvre en fibre. L'administration de levure reste sans effet sur le gain de poids et la digestibilité des élements nutritifs.

INTRODUCTION

Rabbit farming is increasing in most of the developing countries and attracting the attention of scientists and farmers due to their smaller body size, short gestation intervals, high reproductive potential, rapid growth rate and ability to utilise forage and by-products as major diet components (CHEEKE, 1986). The use of antibiotics and probiotics as growth promoters is not new and a good number of reports are available on poultry, swine and other large animals (WILLIAMS and NEWBOLD, 1990). The beneficial response of yeast culture on the productivity of dairy cattle has been observed in some cases on high concentrate diets (DAWSON, 1990). The information on the use of probiotics in rabbits is scarce. In most of the reports, probiotics reduced enteritis and mortality but no definite trend has been observed on feed conversion efficiency and growth performance in rabbits (CHEEKE *et al.*, 1989 ; HOLLISTER *et al.*, 1989, 1990 ; MAERTENS, 1992.).

The present investigation was, therefore, undertaken to determine the effect of *Saccharomyces cerevisiae* on the growth performance and nutrient digestibility in New Zealand White rabbits fed two levels of fibre in diet.

MATERIALS AND METHODS

Thirty two laboratory strain New Zealand White rabbits aged six weeks were divided into 4 groups of 8 animals. Animals of group 1 and 2 were fed diet 1 (9.73 % fibre) whereas diet 2 (12.86 % fibre) was given to the animals of groups 3 and 4. Rabbits of group 1 and 3 were given yeast culture (YC) orally. Details of ingredients and chemical composition of diets are given in Table 1.

Yeast culture

Yeast, *Saccharomyces cerevisiae*, strain n° 2094 ITCCF procured from Indian Agricultural Research Institute, New Delhi, was cultured in laboratory in Roux flask on YEPD agar (Yeast extract 3g, peptone 5g, dextrose 10g, agar 20g and distilled water 1l) by inoculating the actively growing yeast cells. The yeast

Table 1 : Composition of diets

	Diet 1	Diet 2
Ingredients (%)		
Maize	50	10
Wheat bran	20	60
Groundnut cake	10	6
Fish meal	8	8
Wheat straw	8	10
Molasses	2	4
Mineral mixtures	1.5	1.5
Salt	0.5	0.5
Chemical composition (% DM basis)		
Organic matter (OM)	89.3	89.9
Crude fibre (CF)	9.7	12.9
Crude protein (CP)	15.6	16.3
Ether extract (EE)	4.2	4.1
Nitrogen free extract (NFE)	59.8	56.6
Ash	10.7	10.1

cells were then harvested in normal saline with the help of glass beads. This yeast suspension was serially diluted and from each dilution plate counting was done. Similarly, percent transmittance of each dilution was determined at 540nm setting the spectrophotometer at zero with normal saline. At 24 % transmittance 5.6×10^7 yeast cells per ml culture were found. A daily dose of 5×10^8 cfu of YC in normal saline was administered orally to rabbit with the help of a graduated dropper.

Feeding and digestion trial

All the rabbits were housed in separate metallic cages having arrangements for feeding, watering and faeces collection. The animals were individually offered *ad libitum* weighed quantity of rations in mash form at 10h and residue was weighed next morning to record daily feed intake. All the rabbits were weighed at weekly intervals during the feeding trial lasting 84 days. A digestion trial of 6 days collection on five animals from each group was conducted at the end of feeding trial. During this period daily collection of faeces was made and proper aliquote was taken and preserved in dilute sulphuric acid for crude protein analysis. A portion of faeces of each animal was dried daily for the estimation of proximate principles.

Chemical analyses

Samples of feed offered, residue left and faeces voided were analysed for dry matter and proximate principles (AOAC, 1980).

Statistical analyses

Data were analysed by two way analysis of variance and the significance of the difference between means was determined as per SNEDECOR and COCHRAN (1968).

RESULTS AND DISCUSSION

The diets were formulated to contain crude protein recommended by NRC (1977). The crude fibre content in diet 2 was about 32 % higher than that in diet 1. The percentage of ingredients of low energy content was also higher in diet 2 than in diet 1.

Mean feed intake per day in two sub–groups on diet 1 was significantly lower in comparison to diet 2 (Table 2) and intake on diet 1 was similar to the earlier

Table 2 : Body weight gain and feed conversion efficiency (FCE) in rabbits given two diets with or without probiotic.

	Diet 1		Diet 2			Statistical Significance	
Probiotics	**P+**	**P–**	**P+**	**P–**	**SEM**	**D1 *vs* D2**	**P+ *vs* P–**
Initial weight (g)	624	603	608	665	81.3	NS	NS
Final weight (g)	1383	1258	1378	1504	114.3	NS	NS
Weight gain 84 days (g)	759	655	770	839	67.6	NS	NS
Weight gain (g/day)	9.04	7.80	9.17	9.90	0.81	NS	NS
Total DM intake in 84 days (g)	5126	4703	5883	7024	382	**	NS
Feed/gain	6.85	7.24	7.76	8.39	0.56	*	NS

Diet 1 : low fibre ; Diet 2 : high fibre ; P+ : with probiotics ; P– : without probiotics ; NS : not significant ; * : P<0.05 ; ** : P<0.01.

Table 3 : Digestibility coefficients and nutritive value of diets in rabbits given with or without probiotics.

Probiotics	Diet 1		Diet 2		SEM	Statistical Significance	
	P+	P–	P+	P–		D1 *vs* D2	P+ *vs* P–
Digestibility coefficients							
Dry matter	66.31	68.53	58.72	61.09	3.30	**	NS
Organic matter	67.82	70.68	60.53	63.13	2.41	**	NS
Crude fibre	34.45	35.78	30.80	34.49	2.61	NS	NS
Crude protein	56.27	55.49	53.77	57.05	2.91	NS	NS
Ether extract	84.40	86.13	79.47	82.49	1.30	**	NS
Nitrogen free extract	77.93	80.96	68.39	70.68	1.74	**	NS
Nutritive value of diet							
Digestible crude protein (%)	8.87	9.15	8.92	9.35	–	–	–
Digestible energy (Kcal/g)	2.87	3.02	2.59	2.68	–	–	–

Diet 1 : low fibre ; Diet 2 : high fibre ; P+ : with probiotics ; P– : without probiotics ; NS : not significant ; ** : P<0.01.

report on the same strain of New Zealand White rabbits (DESHMUKH *et al.*, 1991). Higher DM intake from diet 2 was an attempt by the rabbits to meet the energy requirements from a low energy diet. Such phenomenon in rabbits has been observed in several earlier studies (MENEDEZ *et al.*, 1986 ; LEBAS *et al.*, 1988 ; BARRETO and DE BLAS, 1993). No significant effect of YC could be observed on DM intake on both diets.

Mean digestibility coefficients of DM, OM, CF, CP, EE and NFE as well as the nutritive value of diets on DM basis are presented in Table 3. A significant effect of dietary fibre level on the composition of diet was observed on the digestibility coefficients of DM, OM, EE and NFE which were higher in rabbits fed on diet 1. DESHMUKH and PATHAK (1992) have also reported a decrease in the digestibility of these nutrients with lower energy content in diet.

Mean values of DCP were comparable between the groups and higher digestible energy content in the sub-groups on diet 1 was as per expectation from the high grain diet. The values were similar to earlier observation on the feeding of comparable diets (DESHMUKH and PATHAK, 1991). The effect of YC feeding was non significant on the digestibility of nutrients and nutritive value of the diets (Table 3).

Since energy requirement is compensated through higher feed intake in the rabbits on diet 2 in comparison to diet 1, there was no significant difference in body weight gain either due to diet or due to the use of YC additive (Table 2). Feed conversion ratio observed on the feeding of diet 1 was similar to that reported by DESHMUKH and PATHAK (1991). The overall low growth of rabbits in this study may be due to the slow growing strain of NZW rabbit and to high environmental temperature. Feeding the diets mash rather than in pelleted form also reduces performance (CHEEKE, 1987). DESHMUKH and PATHAK (1991) have also reported similar growth rate in NZW rabbits using the same strain and under similar geographical location. Feeding of YC has not shown any improvement in feed : gain ratio on both the diets which is similar to the observations of MAERTENS (1992). However, in other studies an improvement in body weight gain and feed conversion ratio has been reported due to feeding of probiotics (CHEEKE *et al.*, 1989 ; HOLLISTER *et al.*, 1989, 1990).

Although in the present study no significant effect of feeding YC could be observed on feed intake, digestibility and performance of rabbits but a slight improvement in feed conversion ratio irrespective of dietary energy level may be used as a basis of further studies using different strains of yeast for obtaining a conclusive effect on the performance of growing rabbits.

Received : 20 July 1994
Accepted : 27 September, 1994

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