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EFFECTS OF MICROBIAL FEED ADDITIVE ON PERFORMANCE OF MEAT RABBITS

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Abstract

One hundred twenty Californian x New Zealand rabbits weaned at 28 days were randomly assigned to 4 treatments which consisted of pelleted diets fed ad libitum supplemented with 0, 1.0, 1.5 and 2.0% microbial feed additive. The additive significantly increased average daily gain ($P<0.05$), and resulted in a 4.86 to 8.86% improvement in feed conversion efficiency and a slight but statistically insignificant increase in carcass weight and dressing percentage ($P>0.05$). Considering the multiple comparison of some indexes, it was concluded that the microbial feed additive could usefully be added at a level of 2% in the diet of meat rabbits.

Introduction

With the advance of modern bio-technology, application of microbes has been expanding widely in the feed industry, e.g. in amino acid production, feed protection, food yeast manufacture, etc. (Sogaard, 1990). Recently, exciting progress has been made in utilization of roughage and farm wastes, but there has been little research in China (Sun, 1990). The Institute of Microbiology of Shandong University has made a new kind of feed additive for herbivores and studied its effect on gain and the possibility of its use in meat rabbit feed.

Materials and Methods

Composition and chemical analysis of the basal diet are shown in Table 1. Four experimental diets, beginning with a basal diet, were supplemented with 1.0% (group 1), 1.5% (group 2), 2.0% (group 3) or 0% (control, group 4) microbial feed additive and pelleted. One hundred twenty Californian x New Zealand rabbits weaned at 28 days were randomly assigned to the 4 treatments, 30 rabbits per treatment. The experiment lasted 62 days. During the trial, each rabbit was fed ad libitum, and housed in a 3-tiered hutch. Growth was recorded individually at 28, 60 and 90 days; feed intake was measured daily.

Table 1. Percentage composition and chemical analysis (air dry basis) of basal diet.

Ingredient*	Proportion
Corn meal	37.40
Soybean meal	20.50
Hay meal	25.00
Wheat bran	13.00
Fish meal	1.00
Calcium monophosphate	1.10
Calcium	1.28
Salt	0.50
Methionine	0.22
Nutritional density	
Digestible energy, MJ/kg dry matter	11.87
Crude protein, %	16.83
Crude fiber, %	10.39
Calcium, %	0.97
Phosphorous, %	0.55

* Providing 2.07 g trace mineral mix in each 100 kg basal diet.

Results

Growth Performance

Growth rate, feed intake and feed conversion efficiency of the animals at the end of the trial are shown in Table 2. Groups given the microbial additive had higher average daily gain (33.37, 32.36 and 31.13 g/d) and better feed conversion efficiency (3.19, 3.28 and 3.33 g/g) in comparison to the control group (28.75 g/d and 3.50 g/g), with the difference in average daily gain statistically significant ($P < 0.05$) by analysis of variance.

Table 2. Growth data for rabbits of different groups.

	Average Daily Gain (g/d)	Average Daily Feed Intake (g)	Feed Conversion Efficiency (g/g)
Group 1	31.13 ± 4.62	103.57	3.33
Group 2	32.36 ± 5.90	106.20	3.28
Group 3	33.37 ± 4.56	106.50	3.19
Group 4 (Control)	28.75 ± 3.96a	100.75	3.50

Means bearing common superscript letters in the same column are not significantly different ($P > .05$); different letters are significantly different ($P < .05$) by analysis of covariance.

Carcass Data

Carcass data are summarized in Table 3. There were no significant differences among the 3 additive and control groups ($P < 0.05$), but tendencies toward a lighter relative weight of the gastrointestinal tract of the alimentary canal and higher carcass percentage were noted in the groups given the additive.

Table 3. Dressing percentage and percent organ weights of rabbits.

	Carcass Weight	Dressing Percentage	Fat	Internals for Food	Head	Skin	Feet	Alimentary Canal
Group 1	1358.75 ± 133.81	52.33 ± 1.19	3.66 ± 0.71	4.26 ± .47	5.40 ± .21	13.22 ± 0.49	2.64 ± .40	7.58 ± 0.63
Group 2	1355.00 ± 235.16	50.85 ± 1.06	2.95 ± 0.83	4.72 ± .26	5.48 ± .52	12.66 ± 0.82	2.99 ± .28	7.96 ± 0.68
Group 3	1403.75 ± 227.21	52.84 ± 1.22	4.39 ± 1.08	4.39 ± .41	5.50 ± .43	12.93 ± 0.74	2.65 ± .18	7.40 ± 0.35
Group 4 (Control)	1212.50 ± 249.95	50.33 ± 2.55	2.95 ± 2.12	4.15 ± .45	5.43 ± .13	12.61 ± 0.49	2.83 ± .39	9.02 ± 1.69

Morbidity and Mortality

During the trial, there was only one death in group 2 and group 3, respectively, but four deaths in the control group. Diarrhea was significantly less with animals given additive in comparison with controls. Results indicated that microbial feed additive had potential for increasing resistance and decreasing mortality in growing rabbits.

Discussion

The effect of microbial additive on gain was statistically significant, whereas feed conversion efficiency and carcass percentage improved slightly. The mechanism of the effects are not known, but may have to do with enzymes, vitamins, nucleic acid, unsaturated fatty acid, hormones and unknown growth factors produced in the process of fermentation. It is known that many kinds of enzymes are produced in fermentation, e.g. proteases, amylases, lipases and cellulolytic enzymes.

The rabbit is an herbivorous animal, but with only 8-28% digestibility of crude fiber (Lang, 1981; Kalujin, 1983; Slade and Hintz, 1968), much lower than that of cattle, sheep and goats. However, an appropriate proportion of crude fiber must be provided in the diet in order to prevent enterotoxemia (Spreadbury and Davidson, 1978; Champe and Maurice, 1983). Crude fiber in the diet may be digested directly and decomposed to glucose, holosides and other nutritional material by cellulase in the microbial feed additive, then converted into volatile fatty acid in the hind gut to be utilized by the animal (Hoover and Heitmann, 1972; Hintz and Stevens, 1978). More importantly, digestibility and absorption of crude protein and other organic matter are increased when crude fiber disintegrates. The relationship of fungi and bacteria in the normal intestine is symbiosis. Cellulose-decomposing bacteria in the large intestine may have beneficial effects on some microbes, harmful effects on others, and stimulate reproduction of beneficial microbes. Thus cellulolytic enzyme in microbial feed additive may be the most important factor in stimulating gain in meat rabbits. Unknown growth factors may have important effects in promoting appetite and increasing survival rate of young stock.

Conclusion

Considering multiple comparison of some indexes, 2.0% microbial feed additive in the diet is beneficial for gain in meat rabbits and has significant economic and social benefits for meat rabbit production in developing countries. However, this study is only an initial one; further research on higher quantities of additive needs to be done.

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