EFFECT OF FEEDING DIETS CONTAINING TWO DOSES OF LACTOBACILLUS PLANTARUM BJ0021 ON PERFORMANCE AND SOME CARCASS PARAMETERS OF LOCAL RABBIT

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ABSTRACT: Our study had for objective the effect of feeding diets containing two dose of Lactobacillus plantarum BJ0021 on growth performance in local rabbit. Fifteen young rabbits were weaned and divided into three groups with respect body weight at 42 days of age. Control group(C) was feed a standard food regime. In the treated groups (D1 and D2) the C feed was supplemented with 10ml and 2×10ml fermented milk/animal/day/seven weeks. The results showed that the supplementation of fermented milk diet with 2.16×10^7 cfu Lb. plantarum BJ0021/ml could had a positive effect on the performance of growing local rabbit and commercial carcass weight.

KEY WORDS: Lactobacillus plantarum, Rabbit, growth performance.

INTRODUCTION

Rabbits are monogastric herbivores, which are widely used for research purposes and husbandry (Linage et al., 2004). In relation to the importance of caecal microbial fermentation, the digestive process is very complex and fragile in rabbit. That is why rabbits are rather sensitive to enteric diseases and especially when they are exposed to negative impacts (Marzo, 2001). These diseases have been usually treated by administration of antimicrobial substances. However, because of the general intention to limit antibiotics in animal feed as growth promoter concerning side-effects, resistance and recent public perception about healthy food, new alternatives to antibiotics are needed (Linage et al., 2004).

Probiotics may constitute a safe alternative; the probiotics that contain yeast, live bacteria or bacterial spores can also prevent any diseases of rabbit and improve the health of the animal (Fortun-Lamothe and Drouet-Viard, 2002). The role of different probiotic additives is to sustain digestion processes, to enable better digestibility and food conversion and to improve the healthy of the animal. The addition of probiotic to food for rabbits has a particularly favourable effect on microbial balance in the caecum (Kermauner and Struklec, 1996). Several studies reported the beneficial effect of dietary addition of bacteria, bacteria+ yeast and bacteria + Yeast + Enzyme on health status and zootechnical traits in rabbit (Maertens et al., 1994; Kamra et al., 1996). The aim of our study was to investigate the effect of dietary inclusion of two dose of Lb. plantarum BJ0021 on the performance of growing rabbits.

MATERIALS & METHODES

Bacteria Strain

The bacteria strain used in this study was a local strain isolated in our laboratory from cow’s butter according to Karam and Karam (1994). This local strain was named Lactobacillus plantarum BJ0021. This strain was able to survive in vitro at low pH and in the presence of bile salt, and demonstrated inhibitory activity against Gram+ and Gram- bacteria (Idoui, 1999; Idoui et al., 2007).

Preparation of Fermented milk (FM) and bacterial numeration

Skim milk powder was weighed and dissolved in water to reconstitute 9% skim milk (w/v), then sterilized using an autoclave at 120°C for 10mn and then cooled at 37°C. The sterilized milk was inoculated with Lb. plantarum BJ0021 and incubated for coagulation at 37°C. After coagulation, a series of dilutions was performed and dilutions of 10^-6 and 10^-7 were plated in duplicate onto MRS agar. The plates were incubated at 37°C for 24 h in anaerobic conditions. After incubation colonies were counted.

Experiment design and treatments

All animal experimentation were approved and performed according to our institutional guidelines. Fifteen young local rabbits, 6weeks of age and weighing 599 ± 147 g (mean), were randomly divided into three groups with five members each.
The weanling’s rabbits were acclimated from standard food regime. During the experimental periods all groups were fed the basic regime but the experimental groups were supplemented with fermented milk.

Group C (control): no supplement.

Group D1 (Dose1): 10 ml of fermented milk / rabbit / day for seven weeks.

Group D2 (Dose2): 2×10 ml of fermented milk / rabbit / day for seven weeks.

The supplementation was administered “per-os”. Food and water were accessible at all times. The ingredients of diet are given on table 1. Body Weight (BW) and feed intake were measured at weekly intervals and then daily weight gain and feed conversion ratio (feed: gain) was calculated (Tortuero, 1973).

At the end of the experiment (90 days of age), all rabbits were weighed individually and killed. The carcass were eviscerated and weighed then conserved for 24 H at 4°C. The intestine length and internal organ weight were determinates too.

### Chemical analysis of diet

The dry matter, humidity, crude protein, crude cellulose and organic matter content of diet were determined according to AFNOR procedures (1985).

### Statistical analysis

Results have been treated by an analysis of variance follow-up by a comparison of averages (test of Newman Keuls 1% and 5%). When significant differences were detected, the least significant difference test was used to separate the mean values.

### Results

Table 2 shows the results of chemical composition of the experimental diet. These results show that the percentage as dry matter of crude protein, crude cellulose and organic matter was respectively 12.70 %, 11.44% and 81%

The growth performances of the rabbits are shown in table 3. Addition of *Lb. plantarum* BJ0021 (2.16×10^7 cfu /ml of fermented milk) significantly affected the Feed intake. This parameter was lower for the control group than the experimental groups D1 and D2. In the last week, the difference was +16.60 g/day and + 34.40 g/day for the groups supplemented comparatively to the control group. On the other hand, between W 6 and W 9 of age, the body weight was similar between the animals but at 77 days of age, the difference emerged (P<0.05), whereas significant differences (P<0.05) were detected in daily weight gain after 70days of age. At 77days of age, this parameter was higher (10.00 ± 0.70 g/day for groupD 1 and 10.10 ± 1.91g/day for groupD 2) for the supplemented animals than for the control (5.48 ± 2.53 g/day). However, it was observed that the feed conversion was also better for the rabbits supplemented with fermented milk. The values of this parameter were numerically lower than that of the control with differences not significant (P>0.05). The better results of the feed conversion ratio were obtained with group D 1 with 2.97 ± 0.68 and 2.62 ± 0.88 at 63 and 89 days of age respectively.
TABLE 4. Effect of Lb.plantarum BJ0021 supplementation on carcass parameters, intestine length and internal organ weight of local rabbit (M ± σ).

<table>
<thead>
<tr>
<th>PARAMETERS (G)</th>
<th>CONTROL</th>
<th>D1</th>
<th>D2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight after bleeding</td>
<td>905.0 ± 14.1</td>
<td>1102.5 ± 74.2</td>
<td>1235.0 ± 176.7</td>
</tr>
<tr>
<td>Blood weight</td>
<td>29.0 ± 1.41</td>
<td>41.5 ± 5.0</td>
<td>40.5 ± 2.1</td>
</tr>
<tr>
<td>Skin carcass weight</td>
<td>805.5 ± 15.0</td>
<td>970.5 ± 64.3</td>
<td>1095.0 ± 148.5</td>
</tr>
<tr>
<td>Eviscerated carcass weight</td>
<td>575.0 ± 28.3</td>
<td>727.5 ± 60.1</td>
<td>777.5 ± 104.3</td>
</tr>
<tr>
<td>Carcass weight maintained at 4°C/24H</td>
<td>530.0 ± 42.4</td>
<td>645.0 ± 70.7</td>
<td>760.0 ± 134.3</td>
</tr>
<tr>
<td>Liver weight</td>
<td>37.05 ± 9.82</td>
<td>51.3 ± 1.55</td>
<td>84.58 ± 14.8</td>
</tr>
<tr>
<td>Total Digestive tract weight</td>
<td>232.5 ± 3.5</td>
<td>246.7 ± 2.5</td>
<td>252.5 ± 24.7</td>
</tr>
<tr>
<td>Stomach weight</td>
<td>66.8 ± 17.0</td>
<td>82.8 ± 16.0</td>
<td>87.1 ± 8.46</td>
</tr>
<tr>
<td>Caecal weight</td>
<td>116.0 ± 1.41</td>
<td>95.4 ± 4.6</td>
<td>110.0 ± 7.7</td>
</tr>
<tr>
<td>Intestine length (cm)</td>
<td>271.0 ± 0.1</td>
<td>295.0 ± 0.67</td>
<td>300.0 ± 0.37</td>
</tr>
</tbody>
</table>

a,bMeans with different superscripts in a row differ significantly (p<0.05)

Results on the effect of FM supplementation on the carcass parameters are represented in table 4. It indicated that FM (Lb.plantarum BJ0021) affects the carcass parameters. At the end of the experiment (90 days of age), rabbits were killed, the Body weight was 905.0 ± 14.1, 1102.5 ± 74.2 and 1235.0 ± 176.7 g for group C, groups D1 and D2 respectively. After evisceration, statistical difference (P<0.05) was found between groups, carcass weight was 575.0 ± 28.3 g, 727.5 ± 60.1 g and 777.5 ± 104.3 g for the control and D1, and D2 groups respectively. Finally, rabbits supplemented with FM had significantly higher weight of commercial carcass (645.0 ± 70.7 and 760.0 ± 134.3 g) than the control (530.0 ± 42.4).

As showed in table 4, the probiotic tested did not significantly affect the digestive tract weight, stomach weight, caecal weight and intestine length but statistical difference was found in liver weight between the three groups. The liver weight was 37.05 ± 9.82, 51.3 ± 1.55 g and 84.58 ± 14.5 g for the control group, group D1 and group D2 respectively.

DISCUSSION

A great number of studies has revealed the probiotic potential of lactobacilli as promoter of good health and performance in animals. In our study, supplementing FM to the diet of rabbits affect the growth performance and the weight of commercial carcass. These results were in agreements with those observed by Hussain et al. (1992) who reported positive effects on growth performance when probiotics were added to rabbit. Voros and Gaal (1996) who reported positive effects on growth performance when probiotics and enzymes were added. In studies with rabbits Abdel-Samee (1995) found 8% improvement in feed conversion in young rabbits treated with different probiotics.

It appears that the best results about commercial carcass were unregistered with the group supplemented. The weight of carcass for all animals was very lower because the local rabbit have a little format but the difference with the groups was evident. These results were in agreement with those observed by Ivanov (2004) who reported that the probiotic preparations increased the carcass output by 2%. In contrast to our results, Safalaoh (2006) found that probiotic addition to diets did not affect the commercial carcass of chicks.

As expected, the weight of liver of group D2 was higher than the control and D1 groups. Pankov et al. (2004) have also found higher yield of giblets of male Muscovy ducklings receiving probiotic, compared to the control group. Our results were in agreements with those observed by Ivanov (2004) who reported that the probiotic supplementation resulted in 20% heavier liver than non-supplemented broiler. In other hands, adding lactic acid bacteria to rabbit did not affect the digestive tract weight, stomach weight, caecal weight and intestine length. These results were not in agreement with those observed by Ivanov (2004) who found that feeding probiotics significantly improved the length, weight and volume of small intestines and caecum of broiler chickens.

Fortun-Lamothe and Drouet-Viard (2002) reported that instead of growth promoters with antibiotics that kill some of the rabbit’s own gastrointestinal flora, probiotics promote gut colonisation and stabilize eubiosis by competitive growth against harmful microorganisms, reducing the intestinal pH with production of lactic acid and encouraging digestion by producing enzymes and vitamins.

CONCLUSION

This study has demonstrated that supplementation of local rabbit diets with two dose of Lb.plantarum BJ0021 (Fermented milk), offer potential benefits to the rabbit industry. There is a dose-dependent positive effect of Lb.plantarum BJ0021 on the growth performance of rabbit, such as improvements in final body weight, feed utilisation efficiency and commercial carcass but the adding lactic acid bacteria to rabbit did not affect the digestive tract weight, stomach weight, caecal weight and intestine length.
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CONFLICT OF INTEREST- None

REFERENCES


