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## The Effects of Gum Arabic on Body Weight and Some Blood Elements in New Zealand Cross California and Baladi Rabbits

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**Abstract:** The present study was carried to detect the influence of Gum Arabic on rabbit's body weight, blood cholesterol, glucose and total protein levels. In the present study 5% of Gum Arabic was added to the food rations of both White New Zealand and Baladi rabbits for an experimental period of one month. Body weights were taken on weekly basis while blood variables were measured at the end of the experimental period. The results of the present study suggest that Gum Arabic is associated with increasing body weight of New Zealand rabbits even at low percentage such as 5%, compared to 20% used in previous study. Results also indicate that 5% Gum Arabic shared role in increasing cholesterol level and appeared to have some positive effect on increasing glucose level in the blood stream of the animals studied.

**Key words:** Gum Arabic, rabbits, weight, blood variables

### INTRODUCTION

Rabbit, *Oryctolagus cuniculus*, is primary herbivore which is considered as source of meat, coat, hair and as experimental animal. It is a cheap source of meat and coat. Rabbit coat constitutes more than 90% of the international coat market. Rabbit is also a good source of soft hair that enters in the manufacture of soft clothes.

Rabbits consume different type of green roughage like cow pea, berseem, lucerne, dub grasses and root crops like carrots, turnips, but they can not be satisfactorily raised on roughage diets alone and growth is usually improved when crushed barely, maize, etc. are fed along with roughage. However, the digestibility of roughages in rabbits is lower than in ruminants, but for concentrate feeds there is no difference in nutritive value for rabbits and ruminants<sup>[1]</sup>.

Gum Arabic consists of a mixture of lower molecular weight polysaccharides. It is a complex and variable mixture of arabinogalactan, oligosaccharide and glycoprotein. Main source of Gum Arabic is *Acacia senegal* (L.) Willd and *Acacia seyal* Del. with percentages of 90 and 10% consequently<sup>[2]</sup>. It is produced naturally through a process called gummosis to seal wounds in the bark of the tree<sup>[3]</sup>.

Gum Arabic has several medical uses, such as a demulcent to soothe irritation, especially of mucous membrane. It was noticed that supplementation with Gum Arabic fibers increase fecal nitrogen excretion and lower serum urea nitrogen concentration in chronic renal failure

patients consuming a low protein diet<sup>[4]</sup>. It is one of the safest compounds as no upper level limits have been recommended by FAO/WHO committee<sup>[5]</sup>.

On the effect of Gum Arabic on enzymatic activity<sup>[6]</sup>, it was noted that supplementation of 20, 40, or 200 g kg<sup>-1</sup> for 4 weeks to female rats, ZUR:SIV-Z strain showed that mid-and high-dose level caused a progressive decline in hepatic mixed function oxidase activity.

There are few literature concerning the effect and use of Gum Arabic on rabbit, however, it was found that<sup>[7]</sup> rabbits fed on 20% Gum Arabic for a period of 4 weeks improved weight gain significantly. However, special study on the effect of Gum Arabic in teratology on rabbits<sup>[8]</sup> gave negative results.

The aim of the present study was to investigate the impact of Gum Arabic on rabbit blood elements and weight gain in two different breeds of rabbits, cross Newland California and Baladi. The specific objective was to investigate effects of 5% Gum Arabic diet in comparison to the control diet, as far as weight, cholesterol, glucose, total protein are concerned, with the hypothesis that the addition of 5% Gum Arabic to food ration of rabbit will affect the cholesterol, glucose and total protein levels and body weight.

### MATERIALS AND METHODS

Rabbits of the present study were supplied by fresh food and water for an adaptation period of one month. Thereafter, they were randomly divided into two treatment

groups of five animals each. One group was fed on the control diet and the other on the test diet that included Gum Arabic. The control diet was consisted of sorghum grain (40%), wheat bran (39%), ground nut cake (20%), oyster shell (0.25%), salt (NaCl, 0.5%), minerals (0.25%) and multivitamins (0.25%). The test diet, on the other hand, was prepared from the same rations with the same ratios except that Gum Arabic was added as 5% at the expense of the wheat bran.

Animals of each diet group were weighed on weekly basis for the whole experimental course, at the end of which blood samples were taken for determination of serum cholesterol, glucose level and total protein. Cholesterol was determined by the method of enzymatic oxidation through colormeter. Free and esterified cholesterol originated by means of couple reaction measured by spectrophotometry. Glucose was determined according to the blue enzymatic reaction read by spectrophotometry where glucose level was calculated as a ratio of the standard. Absorbance of the standard was measured. The plasma total protein was estimated.

Baladi rabbits were treated in the exact same way above.

Statistical analysis was conducted where t-test was adopted to decide upon the effects of diets on the variables measured and confirmation was carried by ANOVA.

## RESULTS AND DISCUSSION

Statistical analysis of the data obtained revealed significant differences between the two diets supplied. Consequently, the present study fulfilled its primary aim and confirmed the hypothesis that addition of Gum Arabic to the rabbit diet would increase body weight, improve nutritional status and affect some variables of the blood stream. New Zealand rabbits fed on the diet included Gum Arabic showed higher body weight throughout the experimental course, which is significant after the first and fourth weeks, culminated with an average of 2340 g at the end of the experiment compared to 2125 g for the control diet (Table 1). Data of the blood analyses also showed differences in glucose and cholesterol and levels at the end of the experimental course, although not statistically significant (Table 2). This indicated that addition of only 5% of Gum Arabic to food has positive effect in increasing body weight and conversions of these dry rations into meat, compared to previous studies<sup>[7]</sup> that indicated feeding rabbits on 20% Gum Arabic had increased their body weight.

Baladi rabbits, on the other hand, showed negative response to the Gum Arabic diet. Their body weight were

Table 1: Effects of Gum Arabic diet on body weight(g) of white New Zealand X California rabbits

Measurement	Initial weight	First week	Second week	Third week	Fourth week
Treatment	1560.00	1940.00a	2050.00a	2200.00a	2340.00a
Control	1570.00	1740.00b	1930.00a	2010.00a	2125.00b

Table 2: Effect of Gum Arabic diet on blood parameters of white New Zealand X California rabbits

Animals	Protein (g)	Glucose (mg%)	Cholesterol (mg)
Treatment	4.7960a	68.4300a	104.4300a
Control	5.0500a	61.8425a	87.1600a

Table 3: Effects of Gum Arabic diet on body weight(g) of Baladi rabbits

Animals	Initial week	First week	Second week	Third week	Fourth week
Control	854.5800a	995.0000a	1056.2500a	1145.00a	1293.1250a
Treatment	839.1750a	848.3250b	945.0000b	1025.00b	1050.0000b

Table 4: Effect of Gum Arabic diet on Blood parameters of Baladi rabbits

Animals	Protein	Cholesterol	Glucose
Treatment	6.1825a	72.2475a	86.5100a
Control	5.4200a	38.4575b	76.4525a

Means of the same letter at the same column are not significantly different at 0.05

significantly decreased throughout the experiment. The control diet resulted in significantly better weight compared to the treatment (gum Arabic) diet ( Table 3).

This may be ascribed to the observation that there were low food intake of Baladi rabbits that fed on Gum Arabic ration compared to that of the control diet, which may suggest that Gum Arabic decreased the appetite of the Baladi rabbits. This is in accordance with<sup>[3]</sup> who indicated that foreign breeds of rabbits gain weight better than Baladi rabbits.

The cholesterol level in both kinds of rabbits fed on Gum Arabic diet was increased (Table 3 and 4), being significant in the Baladi rabbits (Table 4). This result is supported by the previous studies that found Gum Arabic associated with an increase in total cholesterol biothensysis<sup>[8]</sup>.

Results also shows an increase in glucose level for both white New Zealand X California and Baladi rabbits although not statistically significant (Table 2 and 4). However, analysis of variance gives significant results at  $p = 0.07$ .

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