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A STUDY ON THE USE OF BIO-TREATMENT TO IMPROVE THE PALATABILITY OF ANIMAL FEED NON-TRADITIONAL IN AL-BAHA AREA

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ABSTRACT

This research was conducted to study the deterioration of natural pastures in the area of Al-Baha- Saudi Arabia. The most important five non-palatable plant species by the animals (*Capparis cartilaginea*, *Aerva javanica*, *Salvadora persica*, *Prosopis juliflora* and *Senna acutifolia*) were identified in the study area. These plants were treated biologically by anaerobic bacteria drawn from the rumen of ruminants.

The sampels were cut into small pieces with an average length of 5 cm. They were treated biologically by adding the rumen content obtained from the sheep by gastric pipe from an opening in the left rumen. The bacteria were treated with distilled water containing 1% sucrose to activate the anaerobic bacteria.

The samples obtained from each plant type were divided by 45 plots for each plant type. The three replicates were stored for each treatment at the appropriate temperature of (30 ± 2 - 35 ± 2 - 40 ± 2) **°C** for 30 days. The sample was taken out for ventilation and provided to the matured female sheep and goats in the early morning period, in order to conduct the palatable experiment and estimate the turnout rate and the proportion of food intake.

The results showed that the presentage of consuming the treated plant of *Salvadora persica* by ederly goats and sheeps was 100%. While the presentage of consuming the treated plant *Senna alexandrina* was (70-75%). But the following plants *Capparis cartilaginea*, *Aerva javanica* and *Prosopis juliflora* were completely non-palatable by the animals, which indicates that the biological treatment applied according to the conditions of research in improving palatability was not applicable to each and every plant.

This biological treatment method can be used in the pastoral areas, it will contribute to the uses of non-palatable plant biomass and convert it into a non-conventional nutritious feed that will reduce the cost of investment and increase the rate of production of meat and other animal products.

Keywords: Biological Treatment, Palatability, Non-Traditional Feeds

INTRODUCTION

Al-Baha area contains a large livestock wealth particularly of sheep and goats. Semi-intensive animals are the dominant species in Al-Baha region, providing natural grazing, availability and wealth.

The key roles in livestock conservation are to reduce investment costs with increasing the yeild of animal products and improve the grazing to an acceptable level of utilization of existing plants with saving time, money and effort. These important steps are used to bridge the food gap in small ruminants as a side-by-side contribution to improve rangeland and reduce competition by low or non-pastoral plants on annual shrubs and pastoral trees.

Aziza et al. [1] recommended that overcoming the hardness of the dates and to enrich them with protein, as well as to improve the digestive and nutritional value by treating it with 4% urea by 40% (weight size) or EM1 solution (60% volume / weight). The corn husk, reed beetle, apiary and mushroom can be used to replace one-third of concentrates in sheep diets without any undesirable effects on rumen or blood components [2]. Mostafa et al. [3] recommended that the treatment of urea and mushrooms can be considered as the best treatment for maize meal in ruminant feeding to improve digestion, digestive value, daily weight increasing, dietary conversion coefficient, and economic efficiency of developing lambs and blood measurements too. Ayman et al. [4] suggested to work on the isolated of banana residues treated with the bacterial bio-fertilizing pollinator (EM1) to reduce the cost of nutrition and increase the yield of milk from dairy cows. The biological treatments of rice straw were used to change its chemical composition in order to improve its nutritional value for the sheep. Such treatments proved to be effective means to benefit from agricultural wastes [5]. Sabah et al. [6] showed that there was no significant difference between in the body's final weight, average daily increasing, the dried atter, and the nutritional efficiency in the sheep used in the expiremnt. Ahmed et al. [7] concluded that biological treatments to raise the nutritional value of rice straw (i.e. food protein) proved to have positive effect for the sheep. Biological treatments also have

the ability to break down lignocellulose materials such as cellulose, hemicellulose and lignin. These treatments are also eco-friendly. The feeding animals value about 70% of the cost of breeding. Small ruminants rely on semi-intensive breeding on the outskirts of the cities, which gives a particular importance to natural grazing, animal density and plant biodiversity [8].

Several factors have a significant impact on the low plant density of palatable pasture plants, which has a negative impact on animal breeders. The most important factors are drought, climate change and the informal overgrazing process, which depends on phytosanitary education and imported supplementary feed mixtures [9]. Therefore, any research should have a positive impact on the environment and help in reducing the production costs of Al-Baha region in general and animal breeders in particular.

Therefore, this study has been conducted to adopt the biological treatment for the sake of improving the feeding method and reducing the production costs in an effective manner. This method will improve plant flora in the Al-Baha region.

MATERIALS AND METHODS

Samples collection and preparation:

The target five plant samples (Table 1) were collected from the ecologically degraded pastures in the plains and plateaus and mountains of Tihama. The samples were identified and brought to the laboratory of the Faculty of Science and Arts in Qalwa. Samples were cut into small pieces with an average length of 5 cm.

Content of rumen was collected from the sheep by gastric pipe from an opening in the left rumen and mixed with 1% sucrose solution to activate the anaerobic bacteria and the pH was sited as pH=6.6.

Experiment setup

The mixture of rumen and sucrose was added to a plant sample at a rate of 200 g per 1 kg into tightly closed bags; air was removed by a vacuum device and stored in the incubator. Treated plant samples were divided into 45 samples for each plant species. Three replicates were stored for 30 days at an appropriate temperature (30 ± 2 - 35 ± 2 - 40 ± 2) °C with pH=6.6. Samples were taken out and well ventilated and then offered to the animals. Experiments were carried out on the sheep and goats. They were fed early morning before any feed was provided to the animals. Rate of turnout and the proportion of food intake were estimated.

Table 1: Expirmental Plant Samples

No.	Scientific Name	Statement	Importance
1	*Capparis cartilaginea*	A leafy plant with a large leafy thick opposite	Non-pastoral
2	*Aerva javanica*	Plant under dendritic leaves	A little palatable
3	*Salvadora persica*	A mulberry tree with many leaves	Unacceptable
4	*Prosopis juliflora*	Evergreen Gaziante leaves opposite leaves	A little unpalatable
5	*Senna alexandrina*	A perennial leaf up to 50 cm in length	Non-pastoral

RESULTS AND DISCUSSION

In Table (2) the results show that both the goats and sheep which were fed on the plant *Salvadora persica* after biological treatment for 30 days at a temperature of 30 ± 2°C and a pH = 6.6 showed full palatablility of this plant (i.e. 100% food consumption) and low of crowding and desire. Similarly the animals of both species goats and sheep were fed on the biologically treated plant *Senna alexandrina* for 30 days at a temperature of 30 ± 2°C at a pH of 6.6. The animals showed acceptable palatability to this plant with about (70-75%) food consumption. However, the following treated plants: *Capparis cartilaginea*, *Aerva javanica*, and *Prosopis juliflora* were not consumed by the animals which indicate the futility of the biological treatment applied in improving palatability of the last three types of plants according to the conditions of research.

In table (3) the results show that the palatability after a 30 days incubation period under the temperature 35 ± 2 °C and pH=6.6.

It was observed that the goats and sheep fed with *Salvadora persica* plant which was treated biologically at the temperature of 35 ± 2°C and a pH of 6.6 for 30 days showed a good palatability that is about 100% of food consumption with low crowding and motivation. Neverthless, the animals of both type's goats and sheep which fed on biological treated plant *Senna alexandrina* shown about 70-75% food consumption and acceptable desire. On the other hand, the animals which fed on other plants *Capparis cartilaginea*, *Aerva javanica*, *Prosopis juliflora* showed negative response and food rejection indicating the futility of the biological treatment for improving palatability applied at this condition.

Table (4) shows the palatability of goats and sheep on the biologically treated plants after 30 days of incubation at 40 ± 2 °C and pH 6.6.

It was noted that the goats and sheep fed on treated *Salvadora persica*

plant showed a good palatability includes full devouring of 100% consumption with low crowding with desire and motivation. And both types of animal goats and sheep fed on biological plant *Senna alexandrina* showed acceptable palatability of partial and limited consumption of food about 70-75%.

The animals fed on remain treated plants *Capparis cartilaginea, Aerva javanica and Prosopis juliflora* did not show any palatability but an aversion of food was observed.

The results obtained prove that the use of non-traditional feeding method is useful for ruminants and it can be used after a proper method of biological treatment to reduse the cost of investment and increase the yield of animal products. These methods have a positive impact on reducing the pastoral load and stopping the degradation of natural pastures [9, 10].

Table 2: Palatability after a 30 day incubation period under the temperature of 30 ± 2 °C

No.	Plant Species	Temperature	pH	Duration	Palatability in goats	Palatability in sheep
1	*Capparis cartilaginea*	30 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
2	*Aerva javanica*	30 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
3	*Prosopis juliflor*	30 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
4	*Salvadora persica*	30 ± 2	6.6	30 day	M 1 ++	M 1 ++
					M 2 ++	M 2 ++
					M 3 ++	M 3 ++
5	*Senna alexandrina*	30 ± 2	6.6	30 day	M 1 +	M 1 +
					M 2 +	M 2 +
					M 3 +	M 3 +

+++ Excellent palatability includes 100% consumption, overcrowding with desire and motivation; ++ Good palatability includes full devouring of 100%, low crowding with desire and motivation; + Acceptable palatability of partial and limited consumption of food; - No palatability and the animals shown aversion of food

Table 3: Palatability after a 30 day incubation period under the temperature of 35 ± 2 °C

No.	Plant Species	Temperature	pH	Duration	Palatability in goats	Palatability in sheep
1	*Capparis cartilaginea*	35 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
2	*Aerva javanica*	35 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
3	*Prosopis juliflora*	35 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
4	*Salvadora persica*	35 ± 2	6.6	30 day	M 1 ++	M 1 ++
					M 2 ++	M 2 ++
					M 3 ++	M 3 ++
5	*Senna alexandrina*	35 ± 2	6.6	30 day	M 1 +	M 1 +
					M 2 +	M 2 +
					M 3 +	M 3 +

+++ Excellent palatability includes 100% consumption, overcrowding with desire and motivation; ++ Good palatability includes full devouring of 100%, low crowding with desire and motivation; + Acceptable palatability of partial and limited consumption of food; - No palatability and the animals shown aversion of food

Table 4: Palatability after a 30 day incubation period under the temperature of 40 ± 2 °C

No.	Plant Species	Temperature	pH	Duration	Palatability in goats	Palatability in sheep
1	*Capparis cartilaginea*	40 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
2	*Aerva javanica*	40 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
3	*Prosopis juliflora*	40 ± 2	6.6	30 day	M 1 -	M 1 -
					M 2 -	M 2 -
					M 3 -	M 3 -
4	*Salvadora persica*	40 ± 2	6.6	30 day	M 1 ++	M 1 ++
					M 2 ++	M 2 ++
					M 3 ++	M 3 ++
5	*Senna alexandrina*	40 ± 2	6.6	30 day	M 1 +	M 1 +
					M 2 +	M 2 +
					M 3 +	M 3 +

+++ Excellent palatability includes 100% consumption, overcrowding with desire and motivation; ++ Good palatability includes full devouring of 100%, low crowding with desire and motivation; + Acceptable palatability of partial and limited consumption of food; - No palatability and the animals shown aversion of food

CONCLUSIONS AND RECOMMENDATIONS

The biological treatment of non-palatable plants used (*Salvadora persica* - *Senna alexandrina*) for 30 days with pH 6.6 and at temperatures of 30 ± 2 °C, 35 ± 2 °C and 40 ± 2 °C showed a good palatability with average desire while other plants *Capparis cartilaginea, Aerva javanica and Prosopis juliflora* showed negative results of palatability at the same conditon.

This technique can be used in the study area to use the non-palatable plant and convert them it into a non-conventional nutritious food that will reduce the cost of investment in animal production and increase the yield of meat and other animal products.

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