Scientific Research

Evaluation of the Properties of Healing of the Extract of Kombucha in Sheep in Growth with Malnutrition, Parasitocis and Respiratory Problems

Rosales Cortes Manuel[1]*, Albarrán Rodríguez Esther[1], Nolasco Rodríguez Guillermo[1], Raúl Leonel De Cervantes Mireles[1], Leticia Ávila Figueroa[1], Jesus Jonatan Iñiguez Orozco[1], Erika Rizo De La Peña[2]

[1]División de Ciencias Veterinarias, Centro Universitario de Ciencias Biológicas Agropecuarias de la Universidad de Guadalajara, Guadalajara, México
[2]Desarrollo de Ovinos y Caprinos del Rancho La Cofradía de la Universidad de Guadalajara, Guadalajara, México
Email: *mrosales@cucba.udg.mx

Abstract

With the objective to evaluate the properties, curatives of kombucha extract as an alternative treatment were used; 20 sheep creoles weaned with stunting, respiratory diseases, parasitic and malnutrition were divided into control and experiment n = 10 groups; the first one was administered by ivermectin 1% (2 mg/kg) subcutaneous, with a reinforcement of closantel 5% (0.5 mg/kg) by oral route and enrofloxacin at 5% (3 mg/kg) intramuscularly for three consecutive days and the second group by oral route 20 ml of extract kombucha per animal each three days for about 4 months, was weighed at the beginning of each month; clinical tests were conducted and statistical data indicated no significant differences in weight gain 30.370 kg/p control, 31.290, 3.503 kg/p experimentally, some showed small differences in blood samples and in stool tests for example, control ended with _Eimeria_ 1.00 ± 0.00, creatinine, 0.17 ± 0.04 mg/dl, uric acid 23.20 5.37 ± mg/dl, 46.12 ± 4.70 MCV, 7.21 ± 0.25 g/dl total protein, 38.20 10.06 ± 1.40 and segmented neutrophils ±1.07, and on the other hand the experimental in erythrocytes present 9783000.00 ± 1036072.17 million, in hemoglobin 13.43 ± 0.51 g/dl, hematocrit 38.87 ± 2.13, and platelet 422320.000 ± 52442.578 thousands. Both groups did not exceed normal parameters, however, physically the experimental animals were better and had no parasites or respiratory problems as opposed to controls.

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*Corresponding author.

Keywords

Ovine, Kombucha, Respiratory and Parasitic Problems

1. Introduction

High costs and the indiscriminate use of drugs and its wrong application can become disruptive in an exploitation since they raise production costs or create cross-resistance to antibiotic with losses as reports ranging from 10% - 15%, which is not counting losses by death of animals, seizures of viscera and channels in the slaughter plants [1]-[4].

Kombucha tea is an organic and symbiotic culture of yeast and beneficial bacteria that form a zooglea (membrane gelatinous to the beginning and rubbery at the end). Their appearance is like the typical cream of household vinegar made from fruits, its composition is controversial because it is not a organism in concrete as fungi or algae may be and however is part of both, of them with a pH of 2.8 - 4 at a temperature of 26˚C [5]-[7].

The beneficial effects of the extract of the kombucha observed in human health are different. It was determined that kombucha regulates blood and gastric pH since it acts as a buffer, helps regulate the activity of the digestive tract by stimulating the motility, defecation, and the production of beneficial microorganisms. It decreases the indigestion, constipation, hemorrhoids, and favors the removed debris and impurities from the body, by their biological characteristics acts as a prebiotic, the digestion process with beneficial physiological effects on the intestine thin, thick, for the health of the host resistant microorganisms present in kombucha are within the group of micro-organism classified as probiotics such as yeasts of the genera Saccharomyces and *Lactobacilli* and *Bifidocaterium Lactobacillus acidophilus* [6]-[8].

It also has antibacterial and antimicrobial activity by the presence of usnic acid at a rate 0.65 g/100ml and acetic acid 1.60 g/100ml, which are present in fermentation for 14 days and those mainly attack the *Staphylococcus aureus*, *Shigellasonnei*, *E. colli*, *Aeromonas hydrophila*, *Yersinia enterocolitica*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Staphylococcus epidermis*, *Campylobacter jejuni*, *Salmonella enteritidis*, *Salmonella typhimurium Bacillus cereus*, *Helicobacter pylori* and *Listeria monocytogenes* [7]-[11].

Butyric acid and glucuronic acid help to strengthen cell membranes, generally avoiding the infestation by parasites and also of kombucha yeast combat *Candida* group to compete with yeasts that are gradually replaced which reproduce vegetatively or by fission more for production of spores. The production of glucuronic acid at a rate of 0.38 g/100ml for 14 days of fermentation helps to stabilize metabolism and detoxify when it combines or mixes with endogenous or exogenous substances that act as toxins and waste and avoid being reabsorbed by the body, therefore they are eliminated by the body's excretory system as a result increasing the body's defenses manifesting itself with vigour and a wellbeing generalized in addition to lowering cholesterol through their elimination by conjugation of the glucoronitransferasa that stimulates the gluconiridacion, also low blood pressure preventing and attacking the arteriosclerosis, a person of approximately 70 kg of weight can consume 60 ml daily of kombucha extract [3]-[9].

Its benefits to cure diseases such as gout, rheumatism, arthritis, etc., presented by the excess of harmful substances deposited in the body such as uric acid, triglycerides that to be conjugated with glucuronic acid contained in kombucha are soluble in water, giving them the ability to be eliminated by the kidneys through urine, in addition the presence of this acid along with glucosamine stimulates the production of acid hyaluronic which helps to form and protect articular cartilages [2]-[9].

2. General Objective

Based on the healing powers that have been shown in previous studies by various authors in this work we use the extract of kombucha as an alternative treatment of low-cost and easy acquisition with the intention of stimulating the immune system, combat respiratory problems, parasitic, detoxify the body and improve the physiological conditions of the animals and that these are reflected in the weight gain and decrease of production costs.

3. Material and Methods

This work was carried out during four months on the premises of the Posta Zootécnica Cofradia of the Univer-

sity of Guadalajara of Mexico in the area of production of sheep, with adlibitum access to water with high percentage of protein and free access, according to technical specifications for the production, care and use of experimental animals (Bovinos, Ovinos y Caprinos) [12].

3.1. Experimental Design

With laboratory tests and necropsies were previously diagnosed with infection by *Pasteurella multosida*, *Oestrusovis*, contagious ecthyma, gastrointestinal parasitic infections, growth retardation, malnutrition and poor physiological conditions were chosen 20 animals males and females recently weaned 16 ± 2 kg divided in two control groups and experimental were identified and weighed at the beginning study and subsequently every month to determine weight gain, the group control applied you as products 2 mg/kg of ivermectin 1% subcutaneous and a month and a half is reinforced with 5 mg/kg of closantel 5%, by oral route and for respiratory problems applied les of intramuscularly 3 mg/kg of enrofloxacin at 5% for three days.

Only became the experimental group a 20 ml of kombucha extract by oral route intake per animal every third day.

3.2. Coprology Analysis

Samples of fresh excrement to the start of work and then one time per month to apply quantitative coprologica McMaster technique, using saturated NaCl saline solution (331 g/Lt of water), as liquid flotation to determine the number and type of paracitos were evaluated 10 fields of a cm^2 per animal with a light microscope with 10× objective [10].

3.3. Blood Chemistry

To evaluate the behavior of the immune system in addition to the physiological status each month is made them count and blood chemistry [10].

3.4. Statistical Analysis

For the analysis of the results the student's t-test and sum of Mann-Whitney ranges with a significance level of 0.05, using the program Sigma Stat 3.1.

4. Results

It was observed that the body weight was similar at the beginning and at the end of the study no statistical differences between the groups, reason why there were no differences in weight of the two groups **Table 1**.

In terms of the identification of the parasite load, in **Table 2**, are the genera of parasites and their number, isolated larvae and eggs of the genera *Eimeria*, *Strongyloides*, *Trichuiris* and *Monienza* in general terms it found no differences in the first sampling, however, in successive surveys statistical differences were found between the control group and experimental had a lower amount of parasites by the effect of kombucha.

Table 3 are reference values and those identified in the blood chemistry determinations, found significant differences in the concentration of glucose in the months of April and may, in the concentration of creatinine in the month of June, in the content of urate in April and June, and finally, in cholesterol in March. Some of the identified values, regardless of the group, do not correspond to the reference values.

Table 4 presents the values of the biometrics hematic sheep were identified some differences but not exceed normal levels in leukocytes count in the month of March and May; in the number of erythrocytes in April, May and June; haemoglobin in March, April, May and June; in hematocrit in June and in platelets in the months of March, May, and June.

Table 5 shows of the results of differential counts of white blood cells are observed, on four dates in them that were monitored are increased neutrophils segmented with significant difference in June. It was observed a similar behavior for eosinophils.

5. Discussion

In relation to the weight gain in both groups behavior was the same which determined that the extract of kombucha if it gave good results as a treatment in the experimental group comparable to the treatment he received

the group control in terms of improvement of the General conditions of the animals.

Found parasitic population was however not very high in the conditions in which animals were with low immune systems and the widespread loss of homeostasis were sufficient to impair their health and in both groups decreased.

In ruminants indicate that glucose is one of the important parameters to determine changes in energy metabolism as it is a reflection of the emotional, nutritional and endocrine status of an animal and as shown in **Table 3** is increased in the first months in the control and the experimental perhaps by the parasitic infections and malnutrition faced by both groups causing alteration of hepatic metabolism.

Creatinine is formed from muscle metabolism along with the phosphocreatine and is excreted by the kidney, is related to muscle problems and kidney disorders levels that were found in animals in both cases were lower than normal values (0.9 - 2 mg/dl) probably due to physiological conditions and health of the animals.

Plasma proteins have different functions as the transport of substances, the maintenance of oncotic pressure, humoral immunity and the maintenance of homeostasis [13], included the albumins and globulins, their concentrations in serum are consistent, however, in the event of bleeding, parasitic infections and nutritional decompensation can be and our study shows increased by alterations of the immune system and chronic diseases who had.

Values of blood cells the number of red blood cells demonstrates low both in the control group as in the experimental, largely by the nutritional and physiological state of animals at the start of the study, there was a recovery from the second month in the experimental group, we found significant differences in the 3rd and 4th month of treatment of kombucha.

Hemoglobin is within normal levels in both groups, showing greater stability and a slight increase in the experimental group and a similar behavior was found in hematocrit, probably associated with physiological and animal health improvement in conditions.

The differential count identified widespread leukopenia, the cellular defense system is exceeded by the chronic problems of animals and can be interpreted that the support of the parasite and the antibiotic and administration of kombucha was allowed to improve the general condition of the animals.

6. Conclusion

In the present study, animals in poor physical condition, who had delayed growth, poor nutrition, cachexia, depression and signs of respiratory diseases in addition to ecthyma Contagiosum, disease causing various immunological disorders in animals, were chosen by what alterations the animals did in the values hematic which is offset in the experimental group with the use of extracts of kombucha according to previous studies showing a

Table 1. Body weight (kg) of control and experimental sheep, there were no statistical differences between control and experimental groups, student's t-test at a level of significance of 0.05%.

Group	March	April	May	June
Control	17.400 ± 2.011	21.000 ± 2.261	23.750 ± 1.799	30.370 ± 3.745
Experimental	16.200 ± 1.476	19.500 ± 1.269	23.330 ± 2.142	31.290 ± 3.503

Table 2. Quantification of parasites in control and experimental sheep, Nd, non-detected. (*) shows statistical differences between groups, Mann-Whitney level of significance of 0.05%, Sigma Stat 3.1.

Group	March	April	May	June
		Eimeria spp		
Control	$4.30 \pm 0.67^*$	$3.50 \pm 0.53^*$	$1.50 \pm 0.53^*$	$1.00 \pm 0.00^*$
Experimental	3.30 ± 0.95	1.00 ± 0.82	0.20 ± 0.42	0.10 ± 0.32
		Strongyloides spp **eggs**		
Control	3.10 ± 0.88	$3.40 \pm 0.70^*$	$1.600 \pm 0.69^*$	0.10 ± 0.32

Continued

Experimental	3.70 ± 0.95	Nd	Nd	Nd
		Strongyloides spp **larvae**		
Control	3.90 ± 0.99	3.30 ± 0.82*	1.10 ± 0.32*	0.10 ± 0.32
Experimental	3.90 ± 1.10	Nd	Nd	Nd
		Trichuris spp **eggs**		
Control	3.00 ± 1.33	1.20 ± 0.42*	0.60 ± 0.70	Nd
Experimental	2.90 ± 0.88	0.60 ± 1.26	Nd	0.60 ± 1.26
		Trichuris spp **larvae**		
Control	3.30 ± 1.16	1.30 ± 0.48*	1.10 ± 0.57*	Nd
Experimental	3.40 ± 0.97	nd	Nd	Nd
		Monieneza spp **eggs**		
Control	2.70 ± 0.67	2.70 ± 0.67	0.70 ± 0.48*	0.30 ± 0.95
Experimental	2.70 ± 0.67	2.70 ± 0.67	Nd	Nd
		Monienza spp **larvae**		
Control	2.90 ± 0.57	3.80 ± 0.42*	0.80 ± 0.42*	Nd
Experimental	2.90 ± 0.56	0.30 ± 0.95	Nd	Nd

Table 3. Blood chemistry values of control and experimental sheep, Reference values taken from [10], (*) indicates statistical differences between groups, test t student or sum of ranks Mann-Whitney, significance level of 0.05%, Sigma Stat 3.1.

Group	March	April	May	June
		Blood glucosa reference values (44 - 81.2 mg/dl)		
Control	100.60 ± 35.13*	117.40 ± 20.32*	112.00 ± 15.78	43.60 ± 11.96
Experimental	84.60 ± 31.16	95.90 ± 15.40	104.00 ± 28.17	48.50 ± 8.83
		Urine creatinine reference values (0.9 - 2.7 mg/dl)		
Control	0.26 ± 0.14	0.20 ± 0.07	0.24 ± 0.07	0.17 ± 0.04*
Experimental	0.28 ± 0.12	0.25 ± 0.10	0.24 ± 0.06	0.25 ± 0.07
		Uric acid reference values (10 - 26 mg/dl)		
Control	21.60 ± 3.98	23.70 ± 2.11*	22.40 ± 2.22	23.20 ± 5.37*
Experimental	20.30 ± 2.58	20.80 ± 2.25	21.00 ± 1.63	19.80 ± 1.03
		Triglyceride reference values (16 - 20 mg/dl)		
Control	16.20 ± 4.10	16.30 ± 3.02	17.00 ± 1.70	17.70 ± 9.04
Experimental	18.60 ± 5.97	19.20 ± 4.54	16.80 ± 2.35	13.70 ± 3.02
		Cholesterol reference values (80 - 120 mg/dl)		
Control	291.00 ± 27.65*	110.30 ± 41.09	77.60 ± 13.38	93.80 ± 9.02
Experimental	103.70 ± 7.73	124.20 ± 17.47	76.90 ± 10.34	90.20 ± 6.97

Table 4. Average values and standard deviation of hematic biometry in sheep, reference values taken from [10], (*) indicates statistical differences between groups, test t student or sum of ranks Mann-Whitney, significance level of 0.05%, Sigma Stat 3.1.

Group	March	April	May	June
Leukocytes (4.0 - 12.0 thousand)				
Control	3821.00 ± 434.19	5160.00 ± 1066.35	7295.00 ± 696.58	7333.00 ± 1547.06
Experimental	4271.00 ± 266.47*	5583.00 ± 027.59	8154.00 ± 1005.02*	8190.50 ± 1190.38
Erythrocytes (8.0 - 15.0 million)				
Control	4199000.00 ± 459890.08	5845000.00 ± 1202416.54	7750000.00 ± 1053301.687	7639200.00 ± 867490.48
Experimental	4417700.00 ± 326128.14	7711200.00 ± 664671.14*	9827100.00 ± 1120908.20*	9783000.00 ± 1036072.17*
Hemoglobin (9 - 15 g/dl)				
Control	13.16 ± 0.97*	12.180 ± 0.51	12.29 ± 0.93	11.82 ± 0.79
Experimental	11.59 ± 1.07	13.39 ± 0.67*	14.08 ± 1.60*	13.43 ± 0.51*
Hematocrit (27% - 45%)				
Control	37.10 ± 4.41	36.55 ± 2.11	36.75 ± 3.30	34.87 ± 2.87
Experimental	40.21 ± 3.74	36.30 ± 3.11	41.12 ± 5.75	38.87 ± 2.13*
MCH (8 - 12 pg)				
Control	20.10 ± 8.82	15.68 ± 1.68	15.14 ± 1.85	15.57 ± 1.79
Experimental	15.00 ± 2.05	15.62 ± 1.93	13.92 ± 2.09	14.12 ± 2.51
MCV (23 - 48 fL)				
Control	42.60 ± 4.40	47.25 ± 5.02	45.94 ± 5.76	46.18 ± 4.70*
Experimental	44.90 ± 4.38	47.16 ± 5.07	41.33 ± 5.22	39.31 ± 5.72
MCHC (31 - 34 rg/dl)				
Control	33.22 ± 0.28	33.27 ± 2.17	33.05 ± 0.30	33.86 ± 2.18
Experimental	33.28 ± 0.29	33.10 ± 0.87	33.10 ± 0.60	33.28 ± 0.73
Platelets (220 - 680 thousand)				
Control	444900.000 ± 68121.54	311400.000 ± 47103.196	361600.000 ± 150795.815	293500.00 ± 28741.18
Experimental	522200.000 ± 98271.506*	331100.00 ± 74036.70	402520.000 ± 51541.500*	422320.000 ± 52442.578*
Total protein (6 - 7.5 gr/dl)				
Control	8.25 ± 0.41	8.27 ± 0.46*	7.48 ± 0.43	7.21 ± 0.25*
Experimental	8.33 ± 0.28	7.41 ± 0.43	6.70 ± 0.82	6.54 ± 0.57

Table 5. Differential white blood cell count and standard deviation, Reference values taken from [10], ([*]) indicates statistical differences between groups, test t student or sum of ranks Mann-Whitney, significance level of 0.05%, Sigma Stat 3.1.

Group	March	April	May	June
Segmented neutrophils (reference values 40.5%)				
Control	21.10 ± 5.10	19.80 ± 4.80	29.10 ± 6.62	$38.20 \pm 10.06^{*}$
Experimental	$38.50 \pm 11.62^{*}$	19.10 ± 2.72	32.00 ± 5.51	29.30 ± 5.14
Banded neutrophils (reference values 0% - 2%)				
Control	1.20 ± 1.22	0.80 ± 0.63	0.50 ± 0.70	0.20 ± 0.42
Experimental	0.40 ± 0.69	0.80 ± 0.78	0.20 ± 0.42	0.30 ± 0.48
Eosinophils (reference values 3.8% - 6.3%)				
Control	5.60 ± 1.77	6.10 ± 2.33	$2.90 \pm 1.44^{*}$	$1.40 \pm 1.07^{*}$
Experimental	5.10 ± 1.44	4.80 ± 1.98	1.00 ± 1.15	0.50 ± 0.97
Lymphocytes (reference values 42% - 64%)				
Control	54.90 ± 9.44	69.20 ± 4.75	65.40 ± 6.05	59.30 ± 9.78
Experimental	54.40 ± 10.75	$73.80 \pm 2.70^{*}$	66.50 ± 7.04	65.70 ± 6.60
Monocytes (reference values 1.77% - 5.5%)				
Control	1.50 ± 1.26	2.80 ± 1.98	1.90 ± 1.79	1.90 ± 1.79
Experimental	1.60 ± 1.83	1.70 ± 1.70	1.50 ± 2.12	1.90 ± 1.66
Basophils (reference values 0.07% - 0.06%)				
Control	Nd	Nd	Nd	Nd
Experimental	Nd	Nd	Nd	Nd

beneficial effect by having activity antibacterial, antiparasitic, antifungal, anti-allergic and stimulating the immune system in addition to detoxifying the body, on the other hand in the group control was necessary as well as de-worming medications with poor results.

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