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Effect of Turmeric Powder (Curcuma Longa) on Selected Rumen and Blood Serum Constituents in Sheep

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Abstract

This experiment was carried out to investigate the effect of turmeric powder (Curcuma longa) on selected rumen and blood constituents. Ten Egyptian native sheep, their ages ranged between 1.5 - 2.5 years, and body weights 30 - 45kg. They divided into two equal groups. The first group (control group) was fed on traditional ration only, the second (experimental group) was given turmeric powder (500mg /kg body weight orally) in the morning before feeding for 5 days. In first day rumen juice and blood samples were collected from both groups before feeding (considered 0 hour) and at 2nd, 4th, 6th and 8th hours of supplementation with turmeric. In treated group rumen and blood samples were taken daily before feeding from first day up to fifth day of experiment.

Results generally showed that turmeric made significant changes in fermentation pattern in rumen among hours of sampling, while by days it caused marked increased in rumen and serum calcium and rumen inorganic phosphorus; with decreases in serum albumin. On other hand stabilized the rumen pH near to 7, and maintained rumen protozoal activity, TPC, VFAs, ammonia N_2, total protein, globulin, BUN, serum createnine and GGT within the normal range.

Regarding to fermentation pattern on hours, changes occurred in both rumen and blood serum constituents give a recommendation for using turmeric supplementation as 500mg /kg body weight orally for 3-5days in treatment of indigestion and maintenance of normal rumen function. Further investigation should be applied on diseased cases to confirm the effect of turmeric as therapeutic agent in such cases.

(Key words: Turmeric powder, Sheep, Rumen and Blood Constituents)

Introduction

Turmeric (Curcuma longa) belongning to Family: Zingiberaceae is a perennial herb widely cultivated in tropical regions of Asia. It has a long history of therapeutic uses in traditional medicine (Ammon et al. 1992; Aggarwal et al. 2005 and Aggarwal et al. 2007).

Turmeric contains a wide variety of phytochemicals, including curcumin the main active ingredient, demethoxycurcumin, bisdemethoxycurcumin, zingiberene, curcumenol, curcumol, eugenol, tetrahydrocurcumin, triethylcurcumin, turmerin, turmerones, turmeronols and essential oils are also present (Chattopadhyay et al. 2004). Apart from this, turmeric also contains proteins, carbohydrates, fats, minerals, fibres and vitamins (Chattopadhyay et al. 2004). However few studies evaluated its effects on rumen fermentation (Vorlaphim et al. 2011, Hodjatpanah et al. 2010, Hodjatpanah et al. 2011).

This study was conducted to investigate the effect of turmeric powder (Curcuma longa) on rumen physical, cellular, biochemical constituents and blood biochemical constituents in apparently healthy Egyptian sheep regarding to sampling times (0, 2nd, 4th, 6th and 8th hours) and 1st, 2nd, 3rd, 4th and 5th days of supplement.

Material and methods

Animals and experimental design:

A total number of 10 clinically healthy ewes, belong to Department of Medicine and Infectious Diseases, Faculty of Veterinary Medicine, Cairo University, were used in the current study. Their ages ranged from 1.5-2.5 years, and their body weights ranged from 30 - 45kg (mean weight 35.9 kg). Sheep were divided into two equal groups. The first group considered as control group (Gp 1) fed on traditional offered ration included five sheep, the second group (Gp 2) were given turmric powder obtained from a local market, dissolved in a sufficient amount of water; in the morning before feeding for 5 days. The dose (500mg /kg body weight) was determined after Hodjatpanah, et al. (2010), and Khalesizadeh, et al.(2011).

Samples:

Rumen fluid and blood serum were collected from each animal. Samples were taken in the morning before feeding (0 hour) and after 2nd, 4th, 6th and 8th hours of treatment. In experimental group (Gp 2), sampling extended up to fifth day of experiment daily in the morning before feeding and treatment.

The rumen juice samples (about 100 ml) were collected by using a rubber stomach tube in dry clean cup and taken to the laboratory for examination. Color, odor, consistency, pH and

protozoal activity were examined immediately after sampling, then samples were sieved through a 4 folds of sterile gauze used as 2ml fixed with strong acids to determine volatile fatty acids concentration, 2ml for determination of ammonia concentration, 2 ml fixed and stained with methylene green formal saline for microscopic examination. A sample of 10 ml of strained rumen juice was centrifuged for 15 minutes at 3000 rpm and the supernatants were collected to determine the biochemical constituents (calcium and phosphorus).The blood samples were collected by puncture of jugular vein, using vacutainers for separation of serum biochemical analysis (Coles, 1986).

Laboratory examination:

Rumen samples were examined immediately for physical properties include (color, odor, consistency, pH) according to Alonso (1979), Dirksen and Smith (1987) and Radostits et al. (2007), Microscopic examination include protozoal activity according to El-Saifi (1969) and Alonso (1979), Rumen protozoal count according to Ito et al. (1994), Biochemical examination which include total volatile fatty acid (TVFAs) concentration estimated by Macro Kgeldahl steam distillation method as described by Eadie et al. (1967), rumen ammonia nitrogen concentration estimated using specific kits produced by Spectrum Company, Egypt, according to the method of Burtis and Ashwood (1996), rumen Calcium, and Inorganic phosphorus using specific kits produced by Spectrum Company, Egypt, according to the method described by Young (1990), Young (1991).

Blood serum samples examination include estimation of serum total protein by using specific kits produced by Spinreact Company, Spain; according to method described by Young (2001), serum albumin by using specific kits produced by Spectrum Company, Egypt, according to the method described by Tietz (1990), serum globulin level was calculated mathematically by subtracting albumin values from the total serum protein values, albumin and globulin (A /G) ratio calculated by dividing the albumin value by the globulin value, blood urea nitrogen (BUN) according to the method described by Tietz (1990), serum Gamma-glutamyltransferase (GGT) according to the method described by Saw et al. (1983), serum creatinine according to the method of Tietz (1986), serum calcium according to the method described by Young (1990), serum phosphorus according to the method described by Young (1991), all were estimated using specific kits produced by Spectrum Company, Egypt.

Statistical analysis:

Statistical analysis of obtained data was carried out by SPSS program version 21 using k independent samples T test, kruskal- Wallis and one-way ANOVA with Duncan as post hock test. According to Nie et al. 1975 and Levesque, 2007.

Results and discussion

Effect of turmeric powder on physical and cellular constituents of rumen fluid in sheep under effect of sampling times were tabulated in tables 1and 2, showed that their color was ranging between yellowish to brown, odor was aromatic, consistency was slimy to slightly viscous along the experiment, these findings were similar to that observed in control group and that was in agreement with Anderson and Rings (2008), Karapinar et al. (2008). Regarding to protozoal activity in first day of sampling, there were significant increase ($P<0.05$) occurred at 4^{th} and 6^{th} hours when compared with zero time. While among the experiment days, no significant difference ($P>0.05$) occurred. This finding indicated that turmeric tend to increased protozoal activity after few hours of treatment. Relative to TPC in first day of sampling, there were significant decrease ($P<0.05$) occurred at 2^{nd} and 4^{th} hours after treatment before returning to the normal range at 6^{th} and 8^{th} hours. Among the experiment days, no significant difference ($P>0.05$) occurred, the highest value was at 4^{th} day and the lowest value was at 2^{nd} day. These findings indicated that turmeric supplementation tend to decreased total protozoa counts in the few hours after treatment, before return to normal range. Vorlaphim et al. (2011) showed that curcumin feeding to beef cattle significantly lowered the total counts of protozoa, that can be explained on effect of essential oil content of turmeric (Chattopadhyay et al. 2004).

For the rumen pH in first day of sampling, the results showed high significant decrease ($P<0.01$) occurred at 4^{th} and 6^{th} hours and significant decrease ($P<0.05$) at 2^{nd} and 8^{th} hours after treatment. significant decrease ($P<0.05$) also occurred at 4^{th} hour when compared with 8^{th} hour. These findings were slightly different to that observed in control group where high significant decrease ($P<0.01$) occurred at 2^{nd}, 4^{th}, 6^{th} and 8^{th} hours, these results were in agreement with that of Baraka and Abdl-Rahman (2012). Among the experiment days, there were no significant differences at ($P>0.05$) occurred, the highest value

was at 4th day. These finding indicated that turmeric tend to increase rumen pH after few hours of treatment.

Table No. 1. Physical and cellular constituents of rumen fluid regarding to sampling times (0, 2, 4, 6, 8 hours) with and without turmeric powder

Variables	Treatment	0 hour	2nd hour	4th hour	6th hour	8th hour
Color	Gp 2	yellowish-brown				
	Gp 1	yellowish-brown				
Odor	Gp 2	Aromatic				
	Gp 1	Aromatic				
Consistency	Gp 2	Slimy- Slightly viscous				
	Gp 1	Slimy- Slightly viscous				
Protozoa activity	Gp 2	1.40±0.25a	1.80±0.20ab	2.20±0.20b	2.20±0.20b	1.80±0.20ab
	Gp 1	2.20 ±0.20	2.60 ±.025	2.40 ±0.25	2.40 ±0.40	2.40 ±0.25
TPC (×10⁴/ml)	Gp 2	30.10±4.73a	15.40±2.96b	14.40±4.45b	19.90±4.72ab	19.30±4.35ab
	Gp 1	28.60±4.67	17.60±4.41	14.60±3.40	16.60±4.51	20.20±5.43
pH	Gp 2	7.10±0.06a	6.84±0.05bc	6.64±0.10c*	6.70±0.07bc*	6.90±0.03b
	Gp 1	6.92 ±0.04a	6.60±0.03b*	6.52±0.04b*	6.42±0.07b*	6.52±0.09b*

a, b, c Mean values have the similar symbol or symbols within the same raw are not significantly different at P≤0.05.

*. significant at the 0.01 level

It was clear that addition of turmeric stabilized the rumen pH near to 7, which indicates its effect on rumen pH with increase in VFAs and reduction in ammonia N_2. Hodjatpanah et al. (2010) Chaudhry and Khan (2012) mentioned that turmeric had no effect on rumen pH, while Hodjatpanah et al. (2011) and Vorlaphim et al. (2011) recorded decreases in rumen pH.Effect of turmeric powder on rumen biochemical constituents in sheep under sampling times were summarized in tables 3 and 4. For rumen TVFAs concentration in first day of sampling, there were no significant difference occurred between different sampling times before and after treatment, the highest value was at 8th hour, and the lowest value was at 2nd hour. These findings were different with that observed in control group where significant increase (P<0.01) occurred at 6th and 8th hour when compared with the zero time. Among the experiment days, there were no significant difference at (P>0.05) occurred, the highest value was at 3th day, and the lowest value was at 2nd day. These results indicated that turmeric supplementation had no effects on TVFAs concentration. This finding was in agreement with Chaudhry and Khan (2012) who observed that turmeric did not affect the total VFA of rumen fluid for wheat.

Depending on values of physical characters of rumen fluid, protozoal activity, TPC, pH, TVFAs it was clear that supplementation of turmeric stabilized these fermentation parameters within normal range among days, even significant changes observed within hours of sampling.

For rumen ammonia nitrogen concentration in first day of sampling, the results showed high significant decrease (P<0.01) occurred at 4th, 6th hours and significant decrease (P<0.05) at 8th hour. This finding was slightly different to that observed in control group where significant decrease (P<0.05) occurred at 4th, 6th and 8th hours. Among the experiment days, no significant difference at (P>0.05) was occurred, the lowest value was at 2nd day. These result indicated that turmeric supplementation tend to reduce rumen ammonia N_2 concentration after few hours of treatment. Hodjatpanah et al. (2010) and Al-Hadeethi et al. (2016) found no significant effect, while Chaudhry and Khan (2012) observed an increase.

Table No. 2. Effect of turmeric powder on physical and cellular constituents of rumen fluid regarding to sampling days (1st-5th day)

Variables	1st day (control)	2nd day	3th day	4th day	5th day
Color	yellowish-brown				
Odor	Aromatic				
Consistency	Slimy- Slightly viscous				
Protozoa activity	1.40±0.25	1.60±0.25	1.40±0.24	1.40±0.24	1.40±0.24
TPC (×10⁴/ml)	30.10±4.73	25.40±5.97	25.50±4.63	32.70±8.59	28.60±5.04
pH	7.10±0.06	7.06±0.05	7.16±0.04	7.18±0.04	7.16±0.06

Table No. 3. Rumen fluid biochemical constituents regarding to sampling times (0, 2, 4, 6, 8th hour) with and without turmeric powder

Variables	Treatment	0 hour	2nd hour	4th hour	6th hour	8th hour
TVFAs (mmol/L)	Gp 2	67.70±14.32	63.70±3.83	70.50±5.42	71.00±1.89	73.50±4.00
	Gp 1	37.10±2.49a	40.70±3.13a	44.60±1.56ab	53.20±3.08b*	65.10±6.36c*
Ammonia N_2 (mmol/L)	Gp 2	2.85±0.39a	2.34±0.47a	0.76±0.28b*	0.79±0.25b*	0.96±0.34b*
	Gp 1	0.97±0.19a	0.74±0.34ab	0.19±0.01b	0.19±0.01b	0.32±0.11b
Calcium (mg/dL)	Gp 2	5.64±0.46a	9.14±0.58b*	12.63±0.96c*	13.11±0.49c*	11.32±0.44c*
	Gp 1	4.70±.773	7.36±.902	8.88±1.198	9.84±3.36	10.30±2.39
Phosphorus (mg/dL)	Gp 2	59.16±5.88a	54.96±4.01ab	40.34±5.33bc	40.92±4.62bc	38.08±4.99c
	Gp 1	50.68±4.07a	36.13±2.10b	27.39±3.42b*	37.03±4.58b	32.75±4.19b*

a, b,c, Mean values have the similar symbol or symbols within the same raw are not significantly different at P≤0.05.

*. significant at the 0.01 level

Regarding to rumen calcium in first day of sampling, there were high significant increase (P<0.01) occurred at 2nd, 4th, 6th and 8th hours when compared with zero time. Significant increase (P<0.05) was also occurred at 4th, 6th and 8th hours when compared with 2nd hour. This finding was different with that observed in control group where no significant difference at (P>0.05) occurred. Among the experiment days, significant increase (P<0.01) occurred at 4th day. These results indicated that turmeric supplementation increased rumen calcium. high negative correlation was obvious between rumen pH and calcium (R= -0.702).

Relative to rumen inorganic phosphorus in first day of sampling, there were significant decrease (P<0.05) occurred at 4th, 6th and 8th hours after treatment with turmeric when compared with zero time. Significant decrease (P<0.05) occur at 8th hour when compared with 2nd hour. This finding was slightly different with that observed in control group where high significant decrease (P<0.01) occurred at 4th and 8th hours and significant decrease at (P<0.05) at 2nd and 6th hours. Among the experiment days, no significant difference (P>0.05) was occurred. Significant increase (P<0.05) occurred at 5th day when compared with 2nd day. These results indicated that turmeric supplementation slightly increased rumen inorganic phosphorus level when compared with control.

Table No. 4. Effect of turmeric powder on rumen biochemical constituents regarding to sampling days (1st – 5th day)

Variables	1st day (control)	2nd day	3th day	4th day	5th day
TVFAs (mmol/L)	67.70±14.32	52.40±5.49	70.30±9.06	64.70±4.04	64.50±4.70
Ammonia N_2 (mmol/L)	2.85±0.39	2.22±0.59	2.28±0.35	2.82±0.52	2.31±0.46
Calcium (mg/dL)	5.64±0.46 a	6.64±0.29a	7.10±0.59ab	8.61±0.71b*	7.28±0.54ab
Phosphorus (mg/dL)	59.16±5.88ab	49.79±4.00a	55.08±5.91ab	61.29±8.69ab	72.83±8.58b

a, b,c, Mean values have the similar symbol or symbols within the same raw are not significantly different at P≤0.05.

*. significant at the 0.01 level

Effect of turmeric powder on serum biochemical constituents in sheep under sampling times were tabulated in tables 5 and 6. For total serum protein in first day of sampling, there were no significant difference at (P>0.05), the highest value was at 2nd hour. Significant increase (P<0.01) occurred at 2nd hour when compared with 4th, 6th and 8th hours. These findings were similar to that observed in control group. Among the experiment days, there was significant decrease (P<0.05) occurred at 4th day when compared with zero time and 2nd day. Significant increase was recorded by Habeeb et al. (2009), EL-Gohary et al. (2012), Habeeb and El-Tarabany (2012).

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Table No. 5. Serum biochemical constituents regarding to sampling times (0, 2, 4, 6, 8th hour) with and without turmeric powder

Variables	Treatment	0 hour	2nd hour	4th hour	6th hour	8th hour
Total protein (g/dL)	Gp 2	6.80±0.14ab	7.58±0.37b*	6.09±0.27a	6.25±0.24a	6.30±0.30a
	Gp 1	6.24±0.16ab	6.84±0.32b	6.07±0.21a	6.07±0.19a	6.16±0.07a
Albumin (g/dL)	Gp 2	2.86±0.13	2.83±0.10	2.72±0.12	2.63±0.05	2.58±0.08
	Gp 1	2.32±0.02	2.21±0.06	2.32±0.03	2.33±0.07	2.30±0.08
Globulin (g/dL)	Gp 2	3.94±0.18a	4.75±0.29b	3.37±0.23a	3.62±0.27a	3.73±0.26a
	Gp 1	3.93±0.17a	4.62±0.32b	3.76±0.23a	3.75±0.15a	3.86±0.06a
A/G ratio	Gp 2	0.74±0.06ab	0.60±0.03a	0.83±0.07b	0.74±0.06ab	0.70±0.04ab
	Gp 1	0.59±0.03ab	0.49±0.04a	0.63±0.05b	0.63±0.02b	0.59±0.03ab
BUN (g/dL)	Gp 2	19.93±2.55ab	28.01±2.98b	23.55±3.96ab	19.22±3.57ab	16.00±2.64a
	Gp 1	20.43±4.84	21.44±4.07	19.23±4.74	14.35±4.28	16.93±5.46
Calcium (mg/dl)	Gp 2	9.53±0.61a	8.57±0.31a	10.94±0.32b	12.59±0.24c*	10.94±0.32b
	Gp 1	9.37±0.65	9.54±1.17	9.69±0.31	10.50±0.85	10.15±0.62
Phosphorus (mg/dl)	Gp 2	8.85±1.06	8.65±0.82	7.77±0.79	7.34±0.88	6.42±1.38
	Gp 1	9.41±0.78a	9.62±0.35a	9.32±0.84a	7.75±0.68ab	6.57±1.07b
Creatinine (mg/dl)	Gp 2	1.26±0.13	1.19±0.13	1.02±0.12	0.95±0.07	1.12±0.05
	Gp 1	0.98±0.06	0.92±0.07	0.86±0.05	0.82±0.06	0.84±0.06
GGT (U/L)	Gp 2	43.08±1.06	43.15±1.67	40.45±1.67	40.22±1.46	43.15±2.29
	Gp 1	45.93±3.88	43.23±2.25	46.31±3.11	45.31±2.55	47.01±1.74

a, b, c, Mean values have the similar symbol or symbols within the same raw are not significantly different at P≤0.05.

*. significant at the 0.01 level

For serum albumin in first day of sampling, no significant difference (P>0.05) occurred between different sampling times before and after treatment. This finding was similar to that observed in control group where no significant different at (P>0.05) was occurred between different sampling times. Among the experiment days, there were significant decrease (P<0.05) occurred at 3th day and 4th day. These results indicated that turmeric supplementation decreased serum albumin level. EL-Gohary et al. (2012) showed significant increase (P<0.05) in albumin by supplementation does of turmeric powder in goat, while Habeeb and El-Tarabany (2012), Narute et al. (2015) reported that curcumin had no effects on serum albumin.

For serum globulin in first day of sampling there were significant increase (P<0.05) occurred at 2nd hour when compared with zero time, 4th, 6th and 8th hours. This finding was similar to that observed in control group. Among the experiment days, there were no significant differences at (P>0.05) occurred, the lowest value was at 4thday. These results indicated that turmeric supplementation had no effects on serum globulin. Significant increase were reported by Habeeb et al. (2009), EL-Gohary et al. (2012), Habeeb and El-Tarabany (2012).

For serum A/G ratio in 1st day, no significant different at (P>0.05) was occurred between zero time and other times after treatment. Significant increase (P<0.05) was occurred at 4th hour when compared with 2nd hour. This finding was similar to that observed in control group. Among the experiment days, there were no significant differences at (P>0.05) occurred, the highest value was at 4th day and lowest value was at 3th day. Even changes occurred in serum total protein and albumin, the A/G ratio was stable during turmeric supplementation.

Serum BUN in first day of sampling, no significant difference (P>0.05) was occurred between zero time and other times after treatment, the lowest value was at 8th hour and the highest value was at 2nd hour. Significant decrease (P<0.05) was occurred at 8th hour when compared with 2nd hour. This finding was similar to that observed in control group where no significant difference (P>0.05) was occurred between zero time and 2nd, 4th, 6th and 8th hours. Among the experiment days, no significant difference at (P>0.05) in serum BUN was occurred, the highest value was at 4th day. These findings indicated that turmeric supplementation had no effects on BUN. This result was in agreement with Habeeb et al. (2009), Hodjatpanah et al. (2010), EL-Gohary et al. (2012), and Habeeb and El-Tarabany (2012).

Serum calcium in first day of sampling, showed high significant increase (P<0.01) occurred at 6th hour, when compared with zero time, 2nd, 4th, and 8th hours after treatment. Significant increase (P<0.05) was also occurred at 4th, and 8th hours when compared with zero time, 2nd hour. This finding was different with that observed in control

group where no significant difference (P>0.05) occurred between hours. Among the experiment days, there was high significant increase (P<0.01) occurred at 2nd day when compared with zero time, 3th day, 4th day, and 5th day. This finding indicated that turmeric supplementation tend to increased serum calcium specially at few hours after treatment. This finding in agreement with EL-Gohary et al. (2012), while Habeeb et al. (2009) reported that curcumin had no effect. Levels of calcium in both rumen and serum were in high positive correlation after adding of turmeric (R= 0.662).

Table No. 6. Effect of turmeric powder on serum biochemical constituents regarding to sampling days (1st – 5th day)

Variables	1st day (control)	2nd day	3th day	4th day	5th day
Total protein (g/dL)	6.80±0.14a	6.52±0.49a	6.26±0.22ab	5.53±0.39b	5.96±0.09ab
Albumin (g/dL)	2.86±0.13a	2.73±0.09ab	2.49±0.04b	2.53±0.07b	2.70±0.06ab
Globulin (g/dL)	3.94±0.18	3.79±0.49	3.76±0.22	3.00±0.39	3.25±0.06
A/G ratio	0.74±0.06	0.81±.17	0.67±0.04	0.95±.22	0.84±0.02
BUN (g/dL)	19.93±2.55	20.98±3.67	26.85±3.81	31.07±4.79	29.82±4.61
Calcium (mg/dl)	9.53±0.61a	13.05±0.99b*	8.94±0.41a	8.26±0.08a	9.46±0.52a
Phosphorus (mg/dl)	8.85±1.06	10.96±1.07	10.40±1.04	10.95±0.86	9.76±1.29
Creatinine (mg/dl)	1.26±0.13	1.33±0.12	1.13±0.08	1.21±0.12	1.09±0.02
GGT (U/L)	43.08±1.06	42.53±2.35	43.00±2.18	43.39±2.25	41.32±2.22

a, b,c, Mean values have the similar symbol or symbols within the same raw are not significantly different at P≤0.05.

*. significant at the 0.01 level

Serum phosphorus in first day of sampling, showed that no significant difference (P>0.05) was occurred. This finding was different with that observed in control group where significant decrease (P<0.05) occurred at 8th hour when compared with zero time, 2nd, 4th hours. Among the experiment days, no significant difference (P>0.05) was occurred, the higher values were at 2nd day, 4th day and the lowest value was at zero time. These results indicated that turmeric supplementation tend to increased serum phosphorus specially at few hours after treatment. This finding in agreement with Habeeb et al. (2009) and EL-Gohary et al. (2012).

Regarding to effect of sampling according to hours or days, there were no significant differences obtained in serum creatinine and GGT. These results were in agreement with Habeeb et al. (2009), EL-Gohary et al. (2012), Habeeb and El-Tarabany (2012).

Conclusion

Turmeric made significant changes in fermentation patter in rumen among hours of sampling, while by days it caused marked increases in rumen calcium and inorganic phosphorus, serum calcium and inorganic phosphorus; with decreases in serum albumin. On other hand stabilized the rumen pH near to 7, and maintained rumen protozoal activity, TPC, VFAs, ammonia N_2, total protein, globulin, BUN, serum createnine and GGT within the normal range.

We recommend practice of turmeric supplementation as 500 mg /kg body weight orally for 3-5days in treatment of digestive disorders. Further investigation should be applied on diseased cases to confirm that.

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Conflict of interest

Authors declare that they have no conflict of interest.

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الملخص العربي

تأثير مسحوق الكركم (كركوما لونجا) على مكونات مختارة في الكرش ومصل الدم في الأغنام

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أجريت هذه الدراسة لاستقصاء تأثير مسحوق الكركم على مكونات مختارة في الكرش و الدم وذلك على عدد 10خراف مصريه بلديه تراوحت أعمارها بين 1.5-2.5 عاما و أوزانها بين 30- 45 كجم وقسمت إلى مجموعتين متساويتين. الأولى كانت المجموعة الضابطة و التي غذيت على عليقه تقليدية فقط والمجموعة الثانية (التجريبية) أعطيت مسحوق الكركم (500مجم لكل كجم من وزن الحيوان) عن طريق الفم بالإضافة إلى العليقة التقليدية قبل الإفطار صباحا ولمدة 5 أيام. في اليوم الأول من المجموعتين أخذت عينات من سائل الكرش و الدم قبل الإطعام (الساعة صفر) ثم الساعات 2و4 و6 و8 بعد الإطعام. بدءا من اليوم الثاني وحتى الخامس أخذت عينات سائل الكرش و الدم يوميا قبل الإطعام. أظهرت النتائج عامة أن الكركم أدى إلى تغيرات معنوية في عملية التخمر في الكرش على مدار الساعات بينما على مدار الأيام أدى إلى زيادة واضحة في محتوى الكرش ومصل الدم من الكالسيوم وزيادة الفوسفور غير العضوي في الكرش ،انخفاض في مستوى الألبومين في الدم. وعلى الجانب الآخر حافظ على اتزان نشاط أوليات الكرش والعدد الكلى للأوليات وأبقى الأس الهيدروجيني قريب من 7، وحافظ على مستوى الأحماض الدهنية الطيارة مستوى الامونيا ومستوى البروتين الكلي والجلوبيولين في مصل الدم والازوت النيتروجيني في الدم وكذلك الكرياتينين وأنزيم إلجاما جلوتاميل ترانسفيراز في المستويات الطبيعية. بناءا على نظام التخمر في الكرش على مدار الساعات و التغيرات الحاصلة في مكونات كل من الكرش و الدم فإننا نوصى باستخدام مسحوق الكركم بمعدل 500 مجم لكل كجم من وزن الحيوان في الأغنام ولمدة 3-5 أيام في علاج عسر الهضم في الأغنام و الحفاظ على أداء الوظيفة الطبيعية بكفاءة في الكرش. ونؤكد على الحاجة إلى دراسات متقدمة تطبيقية لتأكيد قيمة استخدام الكركم في علاج الاضطرابات الهضمية تلك.

الكلمات الدالة: مسحوق الكركم - الأغنام- مكونات سائل الكرش و الدم.