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EFFECT OF DIFFERENT CONCENTRATIONS OF BANANA PEELS (*MUSA ACUMINATA*) POWDER SUPPLEMENTATION ON SOME PHYSIOLOGICAL ASPECTS IN IRAQI GOAT'S KIDS

Mohamed Karim Hamed Al-Absawi, Tamara N. Dawood and Ahmed A. Taha

College of Veterinary Medicine- University of Baghdad-Iraq

Abstract

This study was designed to evaluate the effect of different concentration of banana peels powder supplementation to growing Iraqi goat's kids on the some productive performance, physiological aspects and rumen digestibility. Twenty healthy Iraqi goat's kids were selected for this study from the animal farm at approximately (4-5) months of age and average body weight (BW) of 23 kg and were reared in the livestock farm located at the research station and agricultural experiments in Abu Ghraib/ Baghdad, experimental feeding was continued for a period of 120 days from 10/5/2019 to 24/9/2019 in addition to 15 days as adaptation period.

After adaptation period, kids were randomly divided into four groups sub divided twenty individual pens, (body weight was considered), The first group was used as a control (with no treatment), the second group was fed banana peels powder (adding 2% of concentrated diet), the third group was fed banana peels powder (adding 4% of concentrated diet) and the fourth group, was fed banana peels powder alone (adding 6% of concentrated diet.).

The results revealed also that there was a significant ($P<0.05$) increased in the RBC_s, Hb PCV%. There was non-significant difference among different groups of Iraqi goat's kids in WBCs count, Monocytes, Basophiles, MCV, MCH and MCHC throughout the experimental period.

In conclusion, Supplementations of the ration with different concentrations of banana peels to growing kids is improved the blood parameters.

Key words: Banana peels, kids, physiological traits.

Introduction

Food additives are important materials which can improve feed use efficiency and animal performance. However, the use of chemical products can cause unfavorable effects, especially those of antibiotics and hormones. Many efforts are being made in the area of animal nutrition to achieve an increase in animal production and thus profit (Abdou, 2001). The reduction in the cost of animal production was directed towards the rational use of all available nutritional resources (Pimentel, Paulo Roberto Silveira *et al*., (2017); Drgham, (2010). The use of agro-industrial co-products and/or by-products in animal feed has been disseminated among cattle farmers, making it possible for the production system to be economically viable. (Murta *et al*., 2011; Urbano *et al*., 2012). Goats spread the planet everywhere because their great adaptability to variable environmental conditions and consequently to the different nutritional regimes under which they evolved and were maintained Alamer, (2009). Banana peels are rich in trace elements, particularly Fe, Cu and Zn and when fed to ruminants, they should not be fed ad libitum, but should be supplemented as a source of organic minerals within the ration of ruminants. (Wadhwa and Bakshi, 2013). Vitamin C, A and B6 and B12 found in bananas (Mosa and Kkalil, 2016). Vitamins play an important role in metabolism and live maintenance, all living organism are need the vitamins (Al-kinani, 1989). The composition of ripe banana peels covers up to 8% crude protein (CP) and 6.2% ether extract (EE), 13.8% soluble sugars and 4.8% phenolic total (Wadhwa and Bakshi, 2013). Bananas help with calcium, nitrogen and phosphorus retention in the body, all of which work to make tissues healthy and regenerated. Bananas may be habitual in fighting bowel disorders like

***Author for correspondence :** E-mail: M2017vet@gmail.com

ulcers. Bananas are among the few fruits that can be consumed safely by ulcer patients (Sampath Kumar *et al.*, 2012). Banana peel is one of the leading fruits and several other studies have shown that banana pulp and peel contain antibacterial and antioxidant principles (Mokbel and Hashinaga, 2005; Sulaiman *et al.*, 2011). Banana used to prevent diarrhea, which was postulated in animals to protect the gastrointestinal mucosa (Dunjic *et al*., 1993).

Materials and Methods

This study was carried out at the research station and agricultural experiments in Abu Ghraib/ Baghdad, from the 10 of May to the 24 of September 2019. experimental period lasted 135 days, (15 days of accommodations) and 120 days of the experiment period.

Experimental design

Twenty healthy Iraqi goat's kids were selected for this study from the Animal farm at approximately (4-5) months of age and the average body weight (BW) was 23 kg. Kids were randomly divided into four groups, which kept in twenty individual pens, (body weight was considered). The first group was used as a control (with no treatment), the second group was fed banana peels powder (adding 2% of concentrated diet), the third group was fed banana peels powder (adding 4% of concentrated diet) and the fourth group, was fed banana peels powder alone (adding 6% of concentrated diet.).

Feeding

Before the starting of the experiment, banana peels were collected from juice shops and dried at oven temperature (60°C for 12hr) (Khawas *et al*., 2014) then milling to powder. Kids were accumulated for the ration 15 day, using provender table 1, (2.5% of live body weight), (Goetsch, 1998 and Al-Masaudi, 2011). Animals were fed in two equal meals at 7:00 AM and 4:00 PM during the day and offered straw roughage ad libitum during non-grazing, they will also supplied freely with tap water.

Measurements and samples collection

- **Hematological parameters:**

Blood samples were collected every 30 days interval via sterilized jugular vein puncture. Blood samples were distributed into two kinds of tubes: EDTA (Ethylene Diamine Tetra acetic Acid) tubes for of CBC (Complete Blood Count) Red blood cells count (RBC_S), Hemoglobin (Hb), Packed cell volume (PCV), (MCH), (MCV), (MCHC), Total white blood cells count (WBC_s) and differential white blood cells count (Nutrophiles %, Lymphocytes %, Monocytes %, Esinophiles %, Basiophiles %).

Table 1: Type and amount of diet those were used in the experiment.

Diet	Type	Amount	Dry matter
Concentrate	Barley 40% , Bran 30%, Soybean 14%, Corn 13%, Nacl 1% and Calcium bicarbonate 2%	2.5% of live B.W.	99.14%
Refuges'	straw	0.3 kg / Kid /day	93.1%

Tubes (5ml) sterile free of anticoagulant for serum samples.

Serum was obtained from whole blood samples after its incubation at 37°C for 2 hrs, subsequently centrifuged at 2500 rpm for 10 min and were stored in the freezer (-16°C) to measure (Glucose, Total serum protein (TSP), Albumine). Liver and Kidney function (ALT, AST, LDH, Total bilirubin, Blood urea nitrogen, Creatinine). Also Lipid profile (Cholesterol concentration, Triglycerides concentration, HDL concentration, LDL concentration and VLDL concentration) and Estimation of vitamin C in blood. (Young and Bermes, 1999). The traits measured and carried out by Auto-analyzer (Ruby-USA).

Statistical analysis

Statistical analysis of data was performed using SAS (Statistical Analysis System - version 9.1). Two way ANOVA and Least significant differences (LSD) post hoc test were performedto assess significant differences among means. $P < 0.05$ is considered statistically significant

Results and Discussion

Blood parameter

- **Red blood cells:**

Table 2 showed that the mean values of red blood cell (Erythrocytes) for the four different groups at different periods. The results revealed that there was a significant ($P < 0.05$) increased in the RBC_s of G2, G3 and G4 at fourth month (8.52±0.14, 8.84±0.08, 8.34±0.12) respectively compared with G1 (7.10±0.36). In addition, G3 and G4 groups at the third month (8.81±0.05, 8.51±0.14) respectively showed there were a significant ($P < 0.05$) increased compare with G1 (7.81±0.29). While the differences among periods within group showed, there were significant differences ($P < 0.05$) between the first, second and third (7.79±0.26, 7.81±0.10. 7.81±0.29) periods of the control group compare with fourth month

Table 2: Effect of different concentrations of banana peels on RBC_s count (10^6/µl) of Iraqi goat's kids (mean ± SE) (n=5).

Group / Period (Month)	G1	G2	G3	G4
1	A7.79±0.26a	A7.88±0.10 a	A8.18±0.32ab	A8.08±0.29a
2	A7.81±0.10a	A7.95±0.25a	A8.07±0.31b	A8.11±0.34a
3	B7.81±0.29a	AB8.22±0.14a	A8.81±0.05a	A8.51±0.14a
4	B7.10±0.36b	A8.52±0.14a	A8.84±0.08a	A8.34±0.12a
LSD	0.66			

Means with a different small letter in the same column significantly different (P≤0.05); Means with a different capital letter in the same row significantly different (P≤0.05).

Table 3: Effect of different concentrations of banana peels on hemoglobin concentration (Hb) (gm./dl) of Iraqi goat's kids (Mean± SE) (n = 5).

Group / Period (Month)	G1	G2	G3	G4
1	A9.03±0.13a	A8.22±0.76b	A8.35±0.25b	A8.30±0.34b
2	B8.50±0.07a	AB9.07±0.18ab	AB9.36±0.80ab	A10.35±0.58a
3	B7.95±0.31a	B8.44±0.49b	A9.96±1.02a	AB9.04±0.53ab
4	B8.46±0.27a	AB9.92±0.23a	A9.98±0.57a	AB8.96±0.59ab
LSD	1.46			

Means with a different small letter in the same column significantly different (P≤0.05); Means with a different capital letter in the same row significantly different (P≤0.05).

Table 4: Effect of different concentrations of banana peels on blood PCV% Iraqi goat's kids (Mean ± SE) (n = 5).

Group / Period (Month)	G1	G2	G3	G4
1	A26.40±0.67ab	A25.29±2.23a	A25.18±0.87a	A27.40±1.97a
2	A32.55±2.75a	A28.40±2.31a	A30.78±3.48a	A30.69±1.89a
3	A24.20±2.76b	A27.36±1.77a	A25.70±5.16a	A28.00±1.61a
4	B19.38±1.78b	A28.34±1.62a	AB24.98±2.74a	AB23.78±3.30a
LSD	7.12			

Means with a different small letter in the same column significantly different (P≤0.05); Means with a different capital letter in the same row significantly different (P≤0.05).

Table 5: Effect of different concentrations of banana peels on blood MCV (fl.) of Iraqi goat's kids (mean ± SE) (n = 5).

Group / Period (Month)	G1	G2	G3	G4
1	A27.40±0.67b	A29.00±3.67bc	A32.20±3.83a	A28.40±2.76b
2	A36.80±0.43a	A36.70±0.63a	A36.42±0.51a	A35.40±0.75a
3	A29.03±0.13b	A34.04±2.24b	A33.06±2.46a	A34.11±2.38ab
4	A29.64±2.28b	A27.34±2.08c	A30.99±2.53a	A30.51±2.55ab
LSD	6.20			

Means with a different small letter in the same column significantly different (P≤0.05); Means with a different capital letter in the same row significantly different (P≤0.05).

(7.10±0.36). Whereas the treated groups G2 and G4 did not showed significant differences among different period within groups, but G2 at 3rd, 4th significant differences (P < 0.05) compare with 2nd period.

• Hemoglobin concentration:

The mean values of hemoglobin concentration for the different groups at different periods are shown in the table 3. Data revealed that there were significant (P < 0.05) increased in the Hb concentration of G3 at third month (9.96±1.02) compared with G1 and G2 (7.95±0.31, 8.44±0.49). The results also showed there were significant differences (P<0.05) in Hb concentration of G3 (9.98±0.57) at fourth month compared with G1 (8.46±0.27). Also G4 group at second month (10.35±0.58) was significantly higher (P < 0.05) compared with G1 (8.50±0.07). The differences among periods showed that G2 at fourth month (9.92±0.23) was significant differences (P< 0.05) compared with first and third months (8.22±0.76, 8.44±0.49) respectively. While G3 at third and fourth months (9.96±1.02, 9.98±0.57) were significantly higher (P<0.05) compared with first month (8.35±0.25). The different among periods of G4 revealed that the second months (10.35±0.58) were significant differences (P<0.05) compared with first month (8.30±0.34).

• Packed cells volume:

Table 4 showed that there were significant (P<0.05) difference among groups within periods, that the second group at the fourth month (28.34±1.62) compared with the control group (19.38±1.78). On the other hand, the difference among periods within G1 cleared that there were significant differences between 2nd months (32.55±2.75) compared with third and fourth months (24.20±2.76, 19.38±1.78). While there were no significant differences among periods within treated groups.

Mean Corpuscular Volume

Table 5 showed that there were non-significant differences among different groups of Iraqi goat's kids in mcv throughout the experimental period. While the results showed, there were significant differences among periods within groups. The table showed that the second month (36.80±0.43) were significantly (P≤0.05) higher than other periods of G1 compare with first, third and fourth months (26.40±0.67,

Table 6: Effect of different concentrations of banana peels on blood MCH (pg.) of Iraqi goat's kids (mean ± SE) (n = 5).

Group / Period (Month)	G1	G2	G3	G4
1	AB34.96±1.96b	B30.82±2.46c	A38.72±2.04b	A39.12±1.95a
2	A34.86±2.07b	A34.82±1.83bc	A40.72±2.34ab	A40.72±2.17a
3	B38.46±1.21ab	AB44.42±2.67a	A46.62±3.68a	AB41.14±2.36a
4	A44.62±0.96a	A39.56±1.58ab	A40.66±2.58ab	A38.82±1.78a
LSD	6.19			

Means with a different small letter in the same column significantly different (P≤0.05); Means with a different capital letter in the same row significantly different (P≤0.05).

29.03±0.13, 29.64±2.28) respectively. Also the G2 group showed significant differences (P≤0.05) between the second and third months (36.70±0.63) with 1st, 3rd and 4th month (29.00±3.67, 34.04±2.24, 27.34±2.08). The differences among periods of the G4 showed significant differences (P≤0.05) in second month (35.40±0.75) compared with first month (28.40±2.76).

Mean corpuscular Hemoglobin

Mean corpuscular Hemoglobin (MCH) concentration of different groups (G1, G2 and G3) were showed significant (P < 0.05) different among periods within group, during the third months of the experiment, but they slightly and gradually increased with age progress (Table 4-13). Animals in G4 group did not showed significant differences among periods. While G2 and G3 groups showed significantly (P < 0.05) higher values in the third month than those of G1 (38.46±1.21). The differences among periods of G1 was significantly (P < 0.05) increased at fourth month (44.62±0.96) compare with first and second months (34.96±1.96, 34.86±2.07). While, G2 was significantly (P< 0.05) increased at third and fourth months (44.42±2.67, 39.56±1.58) compare with first and second months (30.82±2.46, 34.82±1.83b), the G3 at third month (46.62±3.68) were significantly higher than first month (38.72±2.04).

Mean corpuscular Hemoglobin concentration

The mean values of Mean corpuscular hemoglobin concentration (MCHC) for the four G1, G2, G3 and G4 are shown in table 7. The results showed that there were significant (P<0.05) increased of G3, G4 at first and second month (40.72±2.34, 40.72±2.17, 38.72±2.04, 39.12±1.95) respectively compare with G1 and G2 (30.92±2.41, 34.82±1.83, 30.94±2.47, 32.82±2.40). Also G2, G3 and G4 was significantly (P < 0.05) higher at third month (47.16±3.23, 41.50±3.67, 38.94±1.79) respectively compare with G1 (30.96±2.50). While, G2 was significant (P<0.05) increased at third month (47.16±3.23) compare with G3 and G4 (41.50±3.67, 38.94±1.79). However, the differences among periods within group, showed that the concentrations of the G1 group was significantly (P< 0.05) increased at fourth month (39.62±2.63) compare with first, second and third months (30.92±2.41, 30.94±2.47, 30.96±2.50). Also, G2 was significantly (P < 0.05) increased at third months (47.16±3.23) compare with first, second and fourth months (34.82±1.83, 32.82±2.40, 36.56±1.18). while G4 group showed no significant differences among periods.

The results revealed that there was a significant (P < 0.05) increased in the RBC_s of G2, G3 and G4 at fourth month respectively compared with G1. In addition, G3 and G4 groups at the third month respectively showed there were a significant (P<0.05) increased compare with G1. Agreement with Kanazawa and Sakakibara, (2000) who stated that banana peels allegedly contains active compounds, vitamins (A, B, C and E), -carotene. Pantothenic acid, vitamin B2, B12 and folic acid play a role in the formation of erythrocytes, Vitamin B2 is responsible for the turn folic acid into coenzyme, vitamin B12 plays a role in the maturation of erythrocytes (Pilliang and Djojoseobagio, 2006).

(Espino *et al.*, 1992) the juice of the root banana is febrifuge and restorative and in powder form, the juice is used in anemia cases and general weakness and malnutrition. Alsoagreementwith Iweala *et al.*, (2011) previewconsumption plantain of banana could protect the reed cells due to its content of blood forming nutrients such as iron.

Table 7: Effect of different concentrations of banana peels on blood MCHC (g/dl) of Iraqi goat's kids (mean ± SE) (n = 5).

Group / Period (Month)	G1	G2	G3	G4
1	B30.92±2.41b	B34.82±1.83b	A40.72±2.34a	A40.72±2.17a
2	B30.94±2.47b	B32.82±2.40b	A38.72±2.04a	A39.12±1.95a
3	C30.96±2.50b	A47.16±3.23a	B41.50±3.67a	B38.94±1.79a
4	A39.62±2.63a	A36.56±1.18b	A40.88±2.53a	A39.24±3.11a
LSD	4.74			

Means with a different small letter in the same column significantly different (P≤0.05); Means with a different capital letter in the same row significantly different (P≤0.05).

The results that there were significant (P < 0.05) increased in the Hb concentration of G3 at third month compared with G1 and G2. The results also showed there were significant differences (P<0.05) in Hb concentration of G3 at fourth month

compared with G1. Also G4 group at second month was significantly higher (P< 0.05) compared with G1. Meanwhile, banana also is beneficial for the anemic patient because of its iron content. Iron can stimulate the production of hemoglobin in the blood which is essential in cases of anemia. Not only that, the juice of the root banana is febrifuge and restorative and in powder form, the juice is used in anemia cases and general weakness and malnutrition (Espino *et al.*, 1992).

Musa sapientum fruits peels (banana peel) have been reported to prevent anaemia by stimulating haemoglobin production in the blood. Its role in regulating blood pressure has been associated with the a high potassium content (Akinyosoye, V.O. 1991). (Wath, J.N. and M.G. Brayer-Brand, 1962) reported that banana can cure heart stress, strokes, ulcers and many other ailments.

The result PCV that the second group at the fourth month was significant (P<0.05) compared with the control group. These results were agreed with Saidu and Yahay, (2012) the PCV and HB values were respectively significantly different among treatments. These values were similar to the work of Alade *et al.,* (2002). The similar values obtained for all the treatment group indicate nutritional adequacy of the treatment diet found that there is strong influence of diet on hematological traits with PCV and HB being very strong indicators of nutritional status of animals. This also indicated that inclusion of BPM meal was not detrimental to the rabbits enhancement blood parameters.

The results for MCV, MCH and MCHC indicates that there were significant differences (P<0.05) between treatments compare with control. Agreement with Saidu, S.G. and Yahay, A., (2012). This might be as a result of the effects of the BPM meals on them. All values for erythrocytes indices (MCV, MCH and MCHC) were within the normal range. Erythrocytes, hemoglobin, hematocrit and MCHC are very susceptible to changes in environmental temperature and nutrient levels (Roth and Matula, 1980).

In hot conditions, chickens will show changes in behavior, metabolism aimed at maintaining the balance of the milieu interior of physiological and biochemical processes that keep it running, So that when using banana peels to the level of 30% peel until level 30% were able to maintain normal levels of hemoglobin, erythrocytes, hematocrit and MCHC or in other words no chicken physiological disorder Hernawan, (2014).

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