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Assessed investigation on the Cyprian weaned goats' body size and mass after the propolis inclusion

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Abstract

Propolis is a bee product that has antibacterial, antiviral, and antioxidant effects according to various studies. It also improves immune system functions. It has different positive influences that engaged positively in the productivity of animal. The target of the document is to regulate the outcome of different concentrations of aqueous extract of Propolis on the body dimensions and weights of weaned Cyprian goats.

Methods: 24 weaned Cyprian goats aged 90 days were separated into four groups. Standard Set (CG) and threesome treated groups with different doses of aqueous extract of propolis to determine its effect after 2, 4, 6, 8, 12 weeks compared with the control group. The results have appeared important outcome ($p < 0.05$) of propolis in both body dimensions (body length, height at the front, chest, and abdominal circumferences) and body weight after 6-12 weeks of treatment with Propolis extract. It could be concluded that the positive outcome of propolis solution on the organic structure dimensions and weight of weaned goats make it a good choice for improving the weaning stress of goats.

Keywords: Propolis, body dimension, weaned goat, chest girth, body weight

Introduction

Goats are a good source of carnal macromolecule and as an economic root for tiny owners in developing countries (Sako *et al.* 2022, Webb & Pamela 2017) [31, 42]. Furthermore, they have an adaptability to sustain in hard surrounding conditions and produce in cruel environments particularly in dried region. (Webb 2014) [41] Iraq possesses 1.5 million heads of goats (FAO 2014) [13] which counted as remarkable livestock and has a significant role in the production of food and milk particularly below the dominant agricultural regime in the state. The economical importance of the caprine animal relies on its high reproductive and productive ratio and its ability to supply the market with meat and offspring (Hermiz 2005) [17].

Weaning is an extremely stressful time in kids' life that frequently corresponds with diminished development and pitiful benefit once the small fry shifts from consuming liquids to a dry diet. Ablactation is likewise associated with alterations in hormonal and metabolous processes, including lower glucose in the blood, amino acids, and insulin concentrations. Most deleterious effects, however, can be avoided by following appropriate weaning regimens.

Weaning anxiety is the transformation from a milk-based diet to concentrate and forage feed, and the habitation of weaned goats in new circumstances all outcome in impaired immune system function which contributes to frequent health issues. (Thomas 2018) [39].

The weight and growth of dairy goat offspring are important evidence of performance in general and have been observed to vary between and within fields (Deeming *et al.*, 2016) [11]. It is beneficial from measuring the dimensions of the body with the possibility of predicting the body weight in fattening cases through some phenotypical dimensions of the animal's body with a high degree of accuracy. It is also possible to know the body dimensions (for fattening and the appropriate protein percentage and other nutrntional requirements (Salem 2014) [32].

Growth characteristics particularly body weight and their measurements have serious importance in genetic improvement programs because of their economic dividend, and the differences in these properties result from genetic and environmental factors therefore it's important to remove the nongenetic factors to evaluate the genetic parameters (Jalal 2021) [18].

Propolis is an essential hymenopter substance in the establishment of an sterile situation in the hive away, Which is collect from multiple environment of plant life and it use for diverse functions in the hive away. (Bonamigo *et al.* 2017, Kocot *et al.* 2018) [7, 21]. It has antibacterial, antiviral, antifungal effect and exhibits immunomodulatory properties on mammals and immune stimulant (Fan *et al.*, 2013, Onur *et al.* 2018 [12, 26] and Many academic articles connected the chemical substance constituents of propolis are available; it comprise nonsynthetic substances such as polyphenolics, flavonoids, terpenoids, steroids, sugars, and amino group acids (Juszczak *et al.*, 2016) [19]. Several favorable benefits on nutrient consumption, body weight, taste enhancement, flavonoid content, antioxidant, and antibacterial properties have been demonstrated and described in numerous research on propolis (Seven *et al.*, 2009) [39]. Hassan, *et al.* 2020 [16] reported the extract of propolis demonstrated valuable antioxidant properties as well as substantial scavenging of free radicals efficiency.

A lot of research on ruminants has been carried out to investigate the private property of propolis on the rumen's digestion, metabolic process of nutrients, and replication (Zeedan & Komonna, 2013, Kara *et al.* 2014) [45, 20]. Yang *et al.* 2010 [44] found Propolis administration alters various blood parameters of Hanwoo calves significantly. The addition of propolis to the buffalo feeds enhanced feed consumption, reproductive efficiency, milk production, offspring weight at birth, and immunity of offspring as reported by Zeedan & Komonna 2013 [45]. Furthermore, it considers an anti-diarrhea agent and raised the live weight when providing propolis extract to calves. Many studies on its influence on rabbits and chickens have been conducted which prove the positive effect on productive and reproductive performances (Tekeli *et al.* 2011; Hašek *et al.* 2012; Aygun & Sert 2013) [38, 14, 6].

For these properties of propolis, this document goal to measure the outcome of aqueous propolis extract on the body dimensions and weight of weaned goats as transitional stressful period of life.

Animals and Acting

This document was conduit in the Ruminant Rearing Station (in ABO-Graib 30km west of Baghdad). Department of animals resources. Department of Agricultural Researchers/ Ministry of Agriculture/ Iraq at the period of the first of August to the first of November/2021.

Animals Management

It was used 24 healthy weaned kids of Cyprian Male and female goats at the age of 90-97 days, their weight ranged 18-20 kg. All these animals were under veterinarian observation, free of all types of diseases. All animals in the station have been subjected to a healthy and protective program since mating season which includes dipping animals by Pythroid cypermethrin 10% twice yearly against external parasites. They have been vaccinated with Pox and FMD vaccines. All pregnant, adult and newborn animals have been vaccinated against enterotoxaemia (cevacix) yearly at the last month of

the gestation period and at the age of month of newborn kids who were revaccinated after one month.

Newborn kids and revaccinated after one month. All kids and weaned animals (3-6) months were vaccinated against Brucellosis. All animals were dosed with phindex against liver worms and intestine in March and April and repeated after 21 days in addition to spraying the pens with pesticides and disinfectants

A group feeding regime in two equal meals (8 am and 4 pm) was the feeding system of the station A percentage of concentrated feed and protein was 2 and 14% of body weight respectively.

The composition of feed was 37% barley, 35% bran of wheat, 20% popcorn, 5% Soybean, 2% limestone, and 1% salt while the roughage feed was in an adequate amount continually as well as the salt blocks and water.

Research Pattern

Experimental animal like were separate at random into four equal groups (control and treated groups) were distributed in the four semi-open pens occupying an area of 25m² in similar environmental and nutritional conditions.

- A-Control group (CG) without treatment
- B-Treated groups(TG) were divided into three groups as the following
 - Treated group 1 (T₁) which drink 5 ml/ animal aqueous propolis extract twice weekly.
 - Treated group 2 (T₂) which drink 10 ml/ animal aqueous propolis extract twice weekly.
 - Treated group 3 (T₃) which drink 15 ml/ animal aqueous propolis extract twice weekly.
 - The treatment were continuous to 12 weeks
 - Body dimensions and weight were recorded every two weeks till the end the experiment.

Statistical Analysis

To study the effect of different concentrations of probolis on the body dimensions and weight of kids used SAS (2010) according to the following mathematical model and was compared the significant differences between means by Duncan 1966 multiple range test.

Results

Table 1 demonstrates there are no significant ($p>0.05$) differences between treatment and control groups in all body dimensions.

Table 2 demonstrates significant ($p<0.05$) differences between T₁, 2, and 3 (59.00, 57.48, and 57.81 cm) respectively, and control groups (53.00 cm) on the length of the body after 4th week of treatment. Also, there is a significant ($p<0.05$) increase in the chest circumference in the treated groups (T₁, 2, and 3) 60.31, 59.65, and 61.31cm respectively compared with the control group 57.67 cm. As well as, the abdominal circumference increase significantly ($p<0.05$) in the T₁, 2, and 3 groups (79.00, 80.65, and 80.71cm) in contrast with CG (76.14cm). But, there are no statistical differences between treated and control groups in height in the front of weaned goats. However, the result of body weight recorded no statistical differences between the comparative groups.

Table 3 determines significant ($p<0.05$) increases in the body dimensions after 6th week of treatment. Which, the body length among T₁, 2 and 3 was 59.48, 59.00, and 60.31cm respectively compared with the CG 56.15cm. Whereas the height in the front was 57.15 cm in the T₃ which is considered

the highest one compared with the CG (54.81cm). The chest circumference demonstrated statistical increases ($p<0.05$) within increasing the concentration of propolis as the following 65.00, 65.81, and 67.31 contrasted to the CG (63.15) in addition to the highest increases in the abdominal circumference (83.15 and 81.31 cm) in the T₂, and 3 in contrast to the lowest mean (78.81cm) of CG.

These results reflect body weight which elevates significantly ($p<0.05$) in the TGs (T₁ (22.73), T₂ (23.12) and T₃ (23.87) kg) versus CG (22.58 kg).

Table 4 detects a significant effect ($p<0.05$) of TGs in the body length whereas the highest length was in the T₃ (61.81cm) compared with CG (57.81cm). The second adjective that was affected significantly ($p<0.05$) by these treatments was the height in the front which recorded 59.31, 60.48, and 59.15 cm for T₁, T₂, and T₃ respectively compared to the CG (55.48 cm). Regarding the chest circumference, the lowest mean was recorded in the CG (63.00 cm) while it increased significantly ($p<0.05$) in the TGs (67.65, 67.81, and 70.00 cm) in the T₁, 2, and 3. Besides, abdominal circumference appears significant ($p<0.05$) elevation in T₁, 2, and 3 (84.15, 84.65 and 88.48cm) respectively in contrast to CG (84.15cm).

On the other hand, body weight exceeded significantly ($p>0.05$) in TGs (T₁(24.86 kg), T₂(25.13kg), and T₃(25.98 kg)) in matching with CG(24.61kg).

Table 5 determines significant increases in the body's length ($p<0.05$) in the T₁, T₂, and T₃ groups (74.00, 76.10, and 80.07cm respectively versus the CG (72.81cm).

While a highly significant increase ($p<0.01$) in height in the front of the weaned goats in the treated groups with increased doses of propolis (T₃) was (79.15) compared with the CG 67.31cm. It appears from statistical analysis that, chest circumference differences are also significant. The highest result was 82.48cm in the T₃ group, whereas the lowest was 77.48cm in the CG. As well as the abdominal circumference records significant increases in T₁, 2, and 3 (96.00, 95.90, and 100.53cm) respectively compared to CG (95.65cm).

No significant ($p>0.01$) increase in the treated groups in body weight after the 12th week of treatment at the following 28.07, 29.57, and 29.83kg for T₁, 2, and 3 compared to CG (27.84kg).

Discussion

It should be noted that no data on the effect of propolis on body dimensions are found. The non-significant differences among treated and control groups after 2nd week of treatment (Table 1) may be due to the transitional period from liquid to solid food after weaning which is the stressful period to kids which is characterized by incomplete development of the rumen that affects adversely nutrient digestion and absorption (Yáñez *et al.* 2019) [43].

On the other hand, a progressive increase in the body dimensions and weight after 4th week of the study (Tables 2-5) may be from the bioavailability of propolis which contains antioxidant components, minerals, vitamins (Anjum *et al.* 2019) [4], polyphenolic compounds like flavonoids and proteins may improved intestinal functions (Tsuda & Kumazawa 2021) [40] and promote feed efficiency and weight gain (Nishikawa *et al.* 2020, Rajan *et al.* 2021) [24, 29], The results of the current study correspond with Marieke *et al.* 2005 [23] who suggested that it enhances the activity of amylase, saccharase, and phosphatase to provoke nutrient digestion and absorption. Also, it concurs with Seven *et al.*,

2008, 2009 & 2012 [33-35] who have another reason for improving body weight due to the existence of benzoic and 4-hydroxybenzoic acid in the constituents of propolis that may stimulate the digestibility of ash and protein. Daneshmand *et al.* 2015 [10] suggested that the antimicrobial effect and immunomodulatory activity of propolis can stimulate superior employment of nutrient metabolism.

Similar studies emphasize the results of the existing study, Attia *et al.* 2015 [5] reported that propolis improved reproductive and productive performance, improving feed conversion of rabbits significantly and lowering feed intake. Al-Khafaji 2016 found improvement in the body weight of sheep. Hashem *et al.* 2017 [15] findings are that the body weight and feed conversion of rabbits were higher in the groups undergoing diets containing 150 and 300mg/kg propolis versus the control. Also, Shedeed *et al.* 2019 [36] confirmed improvement in efficiency, oxidative status, and immune response in Barki sheep and lambs after propolis supplementation. Abd-Allah & Daghash 2019 [1] found improving daily and final body weight in suckling calves while body measurements were increased mathematically. All these studies' results matched the present study

Whereas Prado 2011 [28] emphasizes that the existence of wax (an indigestible ingredient) in propolis has a defective effect on the digestion of nutrients in New Land rabbits.

Since weaning is a considerably stressful period of kids' life associated with diminished growth and decrease health status once the kid transfers from consuming liquids to a dry diet (Thomas 2018) [39] however the results of the present study have proved the positive effect of propolis on the immune status through the progressing improvement in the body dimension and weight.

Previous studies confirm the same results, Slanzon *et al.* 2019 [37] indicated that red propolis supplementation has the potency to recover calves' health and diminish the occurrence of diarrhea. Shedeed *et al.* 2019 [36] found a significant effect of propolis on immune response and lambs' performance in addition to studies by Cecere *et al.* 2021 declared that propolis declined the number of diarrheal days. Oetting *et al.* 2006 [25] suggested that Herbal extracts might enhance the enzyme efficiency of nitrogen absorption by altering the histology of intestinal epithelium.

It could be concluded that aqueous propolis extract can use in the improve performance of goat in different doses in the most stressful period of life. In recommendation, it needs excessive studies on other animals in various age groups and physiological status particularly the critical period like pre and post-weaning time to detect the protective effect of propolis in reducing the mortality and morbidity rate.

Tables of Results

Table 1: Effect of propolis extract treatment on body dimensions after 2 weeks post-weaned goats (Means +Standard deviation)

Studying Trait	treatment				LS
	CG	T ₁ (5ml)	T ₂ (10ml)	T ₃ (15ml)	
Body length (cm)	55.81±0.38	56.48±0.59	56.81±0.99	55.81±0.61	No
Height at the front (cm)	51.48±1.21	51.81±0.62	52.48±0.39	52.15±0.21	No
Chest Girth (cm)	54.15±0.72	59.00±0.91	58.15±0.69	57.48±0.51	No
Abdomen Girth (cm)	65.48±0.97	74.65±0.88	74.00±0.71	74.00±0.92	No
Body weight (kg)	18.64±.59a	18.66±.48a	18.79±.73a	19.00±.85a	No

No = (No significant)

Table 2: Effect of propolis extract treatment on body dimensions after 4th week post-weaned goats (Means +Standard deviation)

Studying Trait	treatment				LS
	CG	T ₁ (5ml)	T ₂ (10ml)	T ₃ (15ml)	
Body length (cm)	56.00-0.36b	59.00-0.69a	57.48-0.38a	57.81-0.33a	*
Height at the front (cm)	53.48-0.53	54.00-0.27	53.65-0.70	53.31-0.41	No
Chest Girth (cm)	54.65-0.63b	60.31-0.83a	59.65-1.59a	61.31-0.71a	*
Abdomen Girth (cm)	76.14-1.25b	79.00-1.52ab	80.65-1.96a	80.71-1.33a	*
Body weight (kg)	19.51-.67a	19.74-0.72a	19.93-.81a	19.97-.79a	No

*=($p < 0.05$), No=(N0 significant)**Table 3:** Effect of propolis extract treatment on body dimensions after 6th week post-weaned goats (Means +Standard deviation)

Studying Trait	Treatment				LS
	CG	T ₁ (5ml)	T ₂ (10ml)	T ₃ (15ml)	
Body length (cm)	56.15-0.63b	59.48=0.68ab	59.00-0.77ab	60.31-0.58a	*
Height at the front (cm)	54.81-0.33b	56.81-0.29ab	56.65-0.42ab	57.15-0.66a	*
Chest Girth (cm)	63.15-0.73b	65.00-1.23ab	65.81-0.78ab	67.31-1.47 a	*
Abdomen Girth (cm)	78.81-0.92b	81.81-1.44ab	83.15-0.82a	80.31-1.44ab	*
Body Weigh (kg)	22.58-.86b	22.23-1.04b	23.12-.84ab	23.89-0.92a	*

*=($p < 0.05$).**Table 4:** Effect of propolis extract treatment on body dimensions after 8th week post-weaned goats (Means +Standard deviation)

Studying Trait	treatment				LS
	CG	T ₁ (5ml)	T ₂ (10ml)	T ₃ (15ml)	
Body length (cm)	57.80-.97b	60.65-0.73ab	60.15-0.53ab	61.81-0.49a	*
Height at the front (cm)	55.48-.62b	59.31-0.53a	59.48-0.39a	59.15-0.77a	*
Chest girth (cm)	63.80-.61b	67.65-1.29ab	67.81-0.77ab	70.00-1.39a	*
Abdomen girth (cm)	84.15-.33b	84.15-2.18b	84.65-0.66b	88.48-1.92a	*
Body weight (kg)	24.61-.02b	24.86-0.88b	25.13-.17a	25.98-1.09a	*

*=($p < 0.05$)**Table 5:** Effect of propolis extract treatment on body dimensions after 12th week post-weaned goats. (Means +Standard deviation)

Studying Trait	treatment				LS
	CG	T ₁ (5ml)	T ₂ (10ml)	T ₃ (15ml)	
Body length (cm)	72.81-0.63b	74.00-0.82b	76.00-0.62b	80.07-2.27a	*
Height at the front (cm)	67.31-0.42c	70.31-0.39bc	76.81-0.58ab	79.15-1.28a	*
Chest Girth (cm)	70.48-0.73b	79.81-1.39ab	82.48-1.37a	81.62-1.38a	*
Abdominal Girth (cm)	95.65-1.55b	96.00-1.62ab	95.91-0.98b	100.53-1.84a	*
Body weight (kg)	27.84-1.45a	28.87-1.17a	29.57-1.35a	29.83-1.12a	No

*=($p < 0.05$)

Conclusion

Propolis exhibits significant potential to enhance growth and body development in weaned goats, particularly during the stressful transition period from liquid to solid diets. Its antioxidant, antimicrobial, and immunomodulatory properties contribute to improved body dimensions and weight gains, supporting better health and productivity. The study indicates that administering aqueous propolis extract at appropriate doses can mitigate weaning stress effects, promote gastrointestinal health, and optimize growth performance. These findings align with previous research on propolis's beneficial effects across various ruminants. Further studies are recommended to explore its long-term impacts, optimal dosing, and applicability across different breeds and physiological stages to fully harness its advantages in livestock management.

Conflict of Interest: Not available

Financial Support: Not available

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