The Effect of Adding Curcumin on The Body Weights and Weight Gains of Preweaning Calves

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Abstract

: This study aims to determine whether adding curcumin to the diet of calves before weaning has positive effects on their performance. Twelve suckling calves available in the animal field /College of Agriculture/University of Basrah were used in this study. Calves are a cross of Holsteins and local cows weighted 37.6 kg. The study lasted 90 days included 15 days for adaptation. The calves' weight estimated every 30 days. After two weeks of birth, the calves were split into two equal groups based on their equal average weight In addition to suckling, the first group, is the control group was given 200 g of concentrated diet and free access to hay, or roughage feed. The second group , is (the treatment group) received the same diet and nursing as the first group but additionally received 200 mg.head.day -1 of curcumin. The results showed that adding of curcumin to the diet of calves led to a significant improvement)P<0.05) in the mean live body weight during the first, second and third months of the study. The weight at the third month reached 74.8 and 95.2 kg for both the control and treatment groups, respectively. Over the course of three months, the control group and the curcumin-treated group experienced average daily weight gains of 409 and 640 g.day-1,respectively.

Key Words: calves, curcumin, growth performance.

Introduction

Interest has increased recently in the field of livestock and poultry diet which include organic components (herbs and spices) without harming either consumer or animals (4,8).Herbs may improve an animal's appetite and make feed more palatable (15).According to (7) it increased in the release of digestive enzymes, which enhances ruminant digestion and nutrient absorption (28) .Herbs are regarded a great way to enhance the quality of animal products and the physiological health, even when the addition to animal feed does not exceed 0.2 to 2% of the dry matter of the diet(5).Which is affected by many genetic and non-genetic factors(2,3). Curcuma is one of those herbs, containing 70–77% curcumin (24). Polypheno diphenylmethane, curcumin's biologically active component, is responsible for the curcumin aromatic and pigment characteristics (10,26). A combination of the hydroxyl groups in the aromatic ring and the

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double bonds in the alkene (1;21),curcumin has became into antibacterial, antiparasitic, and antioxidant characteristics agent that can replace antibiotics (9,16). According to (27) and (25) inhibit the activity of fungi and viruses. It also augments the immune system, therefore improving the health of poultry and animals and assists them to avoid diseases (18,29). Curcumin's function extends beyond this: it improves milk production in cows and enhances reproductive performance in sheep (14,23).The present study aimed to evaluate adding curcumin to the diet of calves before. they are weaned enhances their performance.

Materials and Methods

Twelve suckling calves available in the animal field /College of Agriculture / University of Basrah were used in this study. Calves are a cross of Holsteins and local cows. They were weighed before the start of the study and their average weight was 37.6 kg. After 15 days, the calves' weight was measured and taken to be their initial weight. Every 30 days after that, they were weighed. The calves have been divided into two equal groups, taking into account the equal average weight for both two weeks after birth. The first group, which was designated as the control group, received 200 g of concentrated ration along with ad libitum roughage fodder (hay) in addition to suckling. The second group, known as the treatment group, received the same diet and nursing as the first group but additionally received 200 mg. head. day -1of curcumin, which was produced by theIranian Dineh Company. Components of the concentrated diet were corn (38%), wheat bran (30%), barley (22%), soybean meal (8%), and a mixture of minerals and vitamins (2%). Table (1)shows the 'chemical composition' of the diet. The duration of the study was 90 days, including 15 days for the calves to acclimate to the feed.

Table (1): Chemical composition of feed Ingredients(%)

Nutrients	%
Dry Matters	92.1
Crude Protein	12.5
Crude Fiber	7.51
Ether Extract	4.15
Ash	3.34
Nitrogen Free Extract	67.8
Metabolizable Energy (MJ/ Kg)	12.74

The metabolizable energy was calculated according to the following equation of the Scottish Ministry of Agriculture MAFE(17): Metabolizable energy MJ/kg dry matter = 0.12 × crude protein + 0.031 × ether extract + 0.005 × crude fiber + 0.014 × soluble carbohydrates

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Statistical Analysis

Statistical test was performed by using SPSS (version 26, 2029) to estimate the statistically significant differences due to the addition of curcumin.

Results and Discussion

Table (2) showed that adding curcumin to the diet of calves led to a significant improvement ($P<0.05$) in the average body weight at the first, second and third months of the study. The weight at the third month reached 74.8 kg to 95.2 kg for both the control and treatment groups, respectively. In the first, second, and third months, the mean increase in the body weight of treated group was 18.18%, 24.51%, and 20.40% respectively, over the body weight of the control group. These results agreed with those of (19), who added 100, and 200 mg.kg -1curcumin to the rations of lambs. The results also agreed with the results of (11) when feeding 300, 600, and 900 mg.kg -1Curcumin to crossbred male lambs. On the other hand, the average daily weight gain was significantly affected ($P<0.05$) in favor of adding curcumin to the diet. The average daily weight gain for three months was 409 and 640 g. day -1 for the control group and those treated with curcumin, respectively. The daily increase as a result of adding curcumin was 56.5% higher compared to the control group. These results were in consistent with those indicated (12) who found an increase in average daily body gain in kids of goats was 54.2% when fed curcumin 2 g.kg -1 feed. Adding Curcumin (200 mg. animal. day -1) led to increase weight gain in Holstein calves during different phases (pre- post-and weaning) (20). and results (13) when adding curcumin to lambs feed, weight gain was 315.1 mg.kg -1of concentrate (d 0 to 30).

Table (2): Effect of the addition of curcumin on body weight of calves

Experimental period	Body Weight (Kg)		
	Control	Curcumin	Monthly increase of Curcumin
Initial	38.0±0.50	37.6±0.4	
1st month	48.4±0.62b	57.2±0.8a	8.80 (18.18%)
2nd month	62.0±0.65b	77.2±1.2a	15.2 (24.51%)
3rd month	74.8±0.74b	95.2±1.9a	20.4 (27.27 %)
Overall			14.8±4.74

ab Means on the same row without common letter are different at $p\leq0.05$

The reason for the improvement in final body weight and weight gain has been attributed to the role of curcumin in activating the function of surrounding epithelial cells, in addition to any improvement in the secretion of digestive enzymes (22). Thus, the ability to digest and

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absorb nutrients in the small intestine increases, which reflects positively on the improvement of the efficiency of utilization of feed. This may be due to the role of curcumin as Antioxidant, anti-inflammatory, antibacterial, antivira , and antiprotozoal (30,12,6).

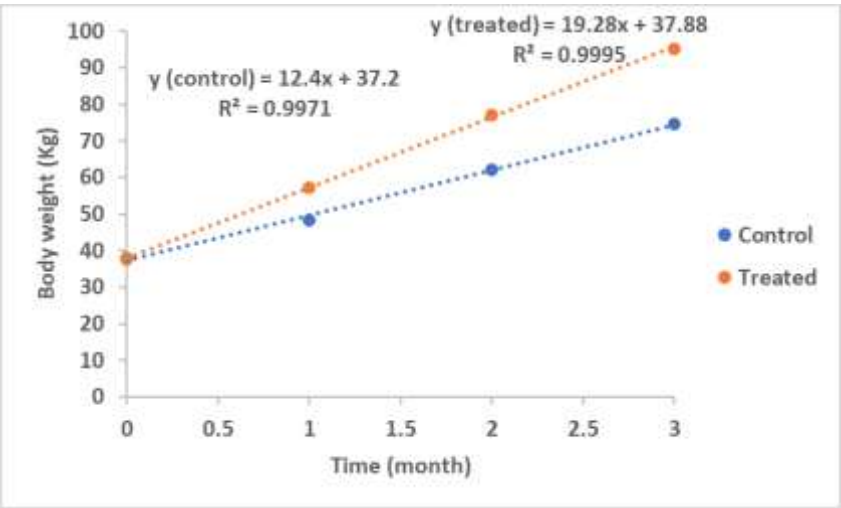

Fig. 1: Linear relationship of calf's body weight and time of experiment

Table (3): Effect of the addition of curcumin on Daily gain of calves

Experimental period	Daily live body weight gains (g)		
	Control	curcumin	Daily increase of curcumin
1st month	347±28.0b	653±96.0a	306 (88.2%)
2nd month	453±33.2b	666±98.1a	213 (47.0%)
3rd month	426±40.3b	600±94.6a	173 (40.6%)
Overall	409±44.2b	640±98.2a	231(56.5%)

ab Means on the same row without common letter are different at p≤ 0.05

Table (4): Economic costs of using curcumin in calf diet

The particulars	**Control**	**curcumin**	
The cost of the concentrated feed (Iraqi dinar)/calf/3 months	54.0	60.8	
Hay price (ID)	6.70	8.90	
Total cost (ID)	60.7	69.7	
Calf selling price (ID)	748	952	
The difference between sale and cost (ID)	687	882	
Prices of calves when the experiment begins (ID)	380	376	
Net profit (ID)	307	506	199

Conclusion

Curcumin may be used to assist calves in gaining weight in anticipation of weaning. Given the low prices at which curcumin (99%) can be bought, it resulted in a 199 thousand Iraqi dinar increase in net revenues per calf. We suggest expanding this study to include more animals in order to confirm the existing findings and potentially make them more useful to breeders. We also suggest using curcumin on other animal species, such as sheep and buffalo, due to its various benefits as a natural antioxidant and antimicrobial.

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