EFFECT OF DIETARY GUAVA (Psidium Guajava L) LEAF EXTRACT SUPPLEMENTATION ON PRODUCTIVE PERFORMANCE, BLOOD PARAMETERS AND CARCASS TRAITS OF GROWING RABBITS

W.A. Morsy, Younan, G.E. and Hoda E. El-Gabry

Animal Production Research Institute, Agricultural Research Center, Dokki, Egypt.

SUMMARY

The present study was designed to investigate the efficacy of different dietary levels of ethanolic guava leaf extract on growth performance, blood parameters, carcass traits, meat chemical composition and economic feed efficiency of growing rabbits. Eighty APRI line rabbits (5 weeks of age and average live body weight of 522±7.12 g) were divided and assigned randomly into four experimental groups of 20 rabbits in each (10 males +10 females). Rabbits in the 1st group were fed complete diet (basal diet) without any supplements (G1, control), while those in the 2nd (G2), 3rd (G3) and 4th (G4) groups were fed the same diet supplemented with guava leaf extract at levels of 1, 2 and 3 ml/kg diet, respectively. Results showed rabbits at the end of growing period (Final weight) were significantly (P<0.05) heavier in treatment groups than in control one. In this line, rabbits fed 1.0, 2.0, 3.0 and 3.0 ml guava leaves extract/kg diet (G3 and G4) had the highest final body weight were heavier by about 3.1, 7.7 and 8.5% than those in G1 (control diet). Daily feed intake was not significantly affect by supplementing guava leaves extract in diets. Feed conversion ratio was significantly improved with increasing guava leaves extract level in diets. Mortality rate was 10, 10, 0 and 0 in G1, G2, G3 and G4, respectively. Carcass percentage was significantly (P<0.05) higher in G3 and G4 than in G1 and G2. Rabbits in G3 and G4 showed the highest revenue (146.7 and 148.6%) relative to those in G1 (100%). In conclusion, guava leaves extract could be successfully incorporated into the diet of growing rabbits up to 3.0 ml/kg diet, which improved production performance without adverse effects on health status during growing period, under Egyptian environmental conditions.

Keywords: rabbit, guava, extraction, growth performance, carcass, blood.

INTRODUCTION

Commercial rabbit production has been gaining much attention in recent years due to their high prolificacy, rapid growth rate, small body size and high meat yield. Rabbits can convert 20% of the dietary protein into edible meat, in comparing with 8-10% in beef (Basavaraj et al., 2011). It is well known that feed additives could be used safely in rabbit diets to improve their performance. Dietary feed additives were used in very small quantities with the objective of obtaining some special effects.

Guava (Psidium guajava) is a small tropical tree that grows up to 35 feet tall; it is widely grown for its fruit in tropics. It is a member of the Myrtaceae family, with about 133 genera and more than 3800 species. Leaves and bark of Psidium guava tree have a long history of medicinal uses that are still employed today (Nwinyi et al., 2008). The main chemical compounds in guava leaves volatile oils were: -pinene (11.77%), epi-bisabolol (10.85%), 1, 8-cineol (9.22%), 1-epi-cubenol (8.56%), globulol (5.88%), thujone (5.35%), hexenal (5.03%) and terpipineol (4.35%) (Ramadan et al., 2009).

This supports the reported use of P. guajava in many countries as a traditional herbal medicine. In this respect, Richard et al. (2013) demonstrated that the leaves of the P. guajava plant solutions were effective for inhibiting the growth of bacteria (S. aureus and S. epidermidis), and fungi (M. gypseum and T. mentagrophytes). The Egyptian guava had volatile extract exhibited in vitro a high antioxidant activity. The potential antioxidant and hypoglycemic activities of guava leaves extract, respectively, are attributed to the presence of relatively high percentage of phenolic compounds (456±10.4 mg gallic acid equivalent/L) and other active volatile compounds with high antioxidant activity (Ramadan et al., 2009). The crude guava extract (250, 500 and 750 mg/kg) provided protection from diarrhoea in guinea-pig, similar to loperamide, a standard anti diarrhoeal agent (Reynolds et al., 1984) and, ethanol extract of guava leaf protected diarrhoea up to level of 55.6% (Porwal et al., 2012). The results of Ramadan et al. (2009) revealed that administration of

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aqueous guava extract (1g/dl) to streptozotocin (STZ) induced diabetic rats for 4 weeks enhanced most of the endogenous antioxidant enzymes activity, as glutathione reductase, superoxide dismutase and total antioxidant capacity, and produced a pronounced hypoglycemic effect as well as the amelioration of most of the studied biochemical parameters in STZ- induced diabetic rats, which confirmed by histo-pathological examination of different body organs. Several authors reported positively for P. guava leaf extract in hyperactive gut disorders (Lozoya et al., 1994; De Wet et al., 2010).

Results of the positive effects of Guava leaf extract on performance of growing rabbits are relatively rare. Therefore, the present study was designed to investigate the efficacy of different dietary levels of ethanolic guava leaf extract on growth performance, blood parameters, carcass traits, meat composition and economic efficiency of growing rabbits.

MATERIALS AND METHODS

The present study was carried out at rabbit farm of Sakha station, belonging to Animal Production Research Institute (APRI), Agricultural Research Center, Ministry of Agriculture, Egypt.

Eighty weaned APRI line rabbits (5 weeks of age and average live body weight of 522±7.12 g) were divided and assigned randomly into four experimental groups of 20 rabbits in each (10 males and 10 females). Rabbits in the 1st group were fed complete diet (basal diet) without any supplements (G1, control group), while those in the 2nd (G2), 3rd (G3) and 4th (G4) treatment groups were fed the same diet supplemented with guava leaf extract at levels of 1, 2 and 3 ml/kg diet, respectively. The basal diet was formulated to cover all essential nutrient requirements for growing rabbits according to De Blas and Mateos (1998) Ingredients and chemical analysis of the basal doet are shown in Table (1). All rabbits were kept under the same managerial conditions. Feed and water were offered ad libitum throughout the experimental period (5 to 13 weeks of age).

Table (1): Feed ingredients and calculated chemical analysis of the reference diet.

| Ingredient                             | %   | Calculated chemical analysis % |
|----------------------------------------|-----|--------------------------------|
| Berseem hay (*Trifolium alexandrinum*) | 30.05 | Crude protein                  | 17.75 |
| Barley                                 | 24.60 | Crude fiber                    | 12.38 |
| Wheat bran                             | 21.50 | Ether extract                  | 2.27  |
| Soybean meal (44% CP)                  | 17.50 | Calcium                        | 1.24  |
| Molasses                               | 3.00  | Total phosphorus               | 0.80  |
| Di-calcium phosphate                   | 1.60  | Lysine                         | 0.98  |
| Limestone                              | 0.95  | Methionine                     | 0.46  |
| Sodium chloride (NaCl)                 | 0.30  | Methionine + Cystine           | 0.76  |
| Vitamin & Mineral Mixture*             | 0.30  | Sodium                         | 0.16  |
| DL-Methionine                          | 0.20  | Digestible energy (kcal/kg diet) | 2500 |

*Supplied per kilogram of diet: Vitamin A, 6000 IU; Vitamin D₃, 9000 IU; Vitamin E, 40 mg; Vitamin K₂, 2 mg; Vitamin B₁₂, 2 mg; Vitamin B₂, 4 mg; Vitamin B₆, 2 mg; Pantothenic acid, 10 mg; Vitamin B₃, 0.01 mg; Niacin, 50 mg; Folic acid, 3 mg; Biotin, 0.05 mg; Choline, 250 mg; Fe, 50 mg; Mn, 85 mg; Cu, 5 mg; Co, 0.1 mg; Se, 0.1 mg; I, 0.2 mg and Zn, 50 mg.

Guava leaves used in this study were collected during summer (September) from Borg El-Arab region, Alexandria governorate, Egypt. The collected guava leaves were cleaned from extraneous matter, shade-dried with passive ventilation and crushed into a fine powder. The air dried plant materials were ground in a blender with a particular size to ensure the plant powders in identical size. The powder (50 g) was macerated in 150 ml ethanol (75%) and allowed to extract for 48 h. The resultant (dark green-brown mixture) was filtered (Mazumdar et al., 2015). The crude extract was kept in refrigerator in glass bottles until the further experiments.

Throughout the experimental period, live body weight, feed intake and number of dead rabbits were recorded. Daily weight gain, feed conversion rate and mortality rate were calculated. Economic efficiency
was calculated according to Raya et al. (1991). Also, relative growth rate and performance index were calculated on a group basis:

Relative growth rate = \( \frac{((W2 - W1) \times 100)}{[1/2 (W2+W1)]} \)

Where as: \( W1 = \) the initial weight, and \( W2 = \) the final body weight

Performance index = (final live body weight (kg)/ feed conversion ratio) x 100 (North, 1981)

At the end of growing period (13 weeks of age), three male rabbits were taken randomly from each group, fasted for 12 h, weighed and slaughtered to estimate some carcass traits according to Blasco et al. (1993). Carcass parts were presented as a percentage of live body weight. Meat samples from each group were taken for chemical analysis. Samples of meat were taken from fore-Limb, Lumber region and Hind Limb, dried at 60°C for 2 days, freed from any bones, and ground for analysis. Chemical analysis of meat (DM, ash and CP) was carried out according to A.O.A.C. (2005). Content of EE in meat was calculated by difference, while chemical composition of the basal diet was calculated.

During slaughtering (at 13 weeks of age), blood samples were taken from slaughtered rabbits of each treatment group to determine hematological and some biochemical constituents. Blood samples were aspirated in EDTA vacuum tubes. Blood was centrifuged at 2500 rpm for 10 min for plasma separation (Burnett et al., 2006). Plasma was stored at -20°C until assaying biochemical parameters.

Hematological parameters, including red blood cells count (RBCs), white blood cells count (WBCs), differential of white blood cells (lymphocytes, heterophils, monocytes, eosinophils, and basophils), hemoglobin (Hb) concentration and package cell volume (PCV) were determined according to Drew et al. (2004).

Biochemical parameters, including total proteins, triglycerides, total cholesterol, high density lipoproteins (HDL) and low density lipoproteins (LDL) were calorimetrically determined in blood plasma by using commercial kits (Bio-Diagonosis Co., Cairo, Egypt), following the manufacturers. Also, total antioxidant capacity (TAC) and Malondialdehyde (MDA) were determined calorimetrically in blood plasma.

Data were statistically analyzed using the General Linear Model Program of SAS (2000). Duncan’s multiple range tests was performed (Duncan, 1955) to detect significant differences among means.

RESULTS AND DISCUSSION

Growth performance parameters:

Data in Table (2) showed that rabbits at the end of growing period (Final weight) were significantly (P<0.05) heavier in treatment groups than in control one. In this line, rabbits fed 1.0, 2.0 and 3.0 ml guava leaves extract/kg diet were heavier by about 3.1, 7.7 and 8.5% than those in G1 (control diet). It is of interest to observe that the highest level of guava leaves extract/kg diet showed the significant (P<0.05) improvement in average daily gain (ADG), feed conversion ratio with insignificant change in feed intake as compared to other guava leaves extract/kg diet at 5-9 wk interval. Meanwhile, at 9-13 wk interval, rabbits in G3 fed diet supplemented with guava leaves extract at a level of 2 ml/kg diet. However, during the entire length of the growing period (5-13 wk) rabbits in G3 showed insignificant differences in all growth performance parameters as compared to those in G4. Based on the significant (P<0.05) effect of treatment on LBW, ADG and FCR with insignificant effect on feed intake at different levels and low mortality rate, rabbits fed diet supplemented with guava leaves extract at levels of 2 and 3 ml/kg diet showed significantly (P<0.05) the highest relative growth rate and performance index and the lowest mortality rate as compared to those fed low guava leaves extract (1 ml/kg diet) and control group.

In agreement with the present results on rabbits, Mahmoud et al. (2013) revealed that dietary supplementation of 1% dried guava leaves in diets had a significant improved effect on body weight, weight gain, feed conversion ratio and healthy status, but had no effect on feed consumption of broiler chicks. The obtained insignificant effect of guava extract on feed intake of rabbits was reported by Rahman et al. (2013), who found that inclusion of guava leaf meal (2.5, 3.5 and 3.5%) in broiler diets did not significantly affect feed intake, but mortality rate was decreased with increased level of guava leaf meal up to 4.5% in broiler diet.
Guava leaves extract has anti-inflammatory, antibacterial and antimicrobial activities that induce positive effects on broilers gut health (Pandey and Shweta, 2011; Ryu et al., 2012). Guava leaves (Psidium guajava L.) containing the active chemical compounds such as saponins, flavonoids, tannins, eugenol and triterpenoids. Polyphenolic compounds dominate guava leaves are flavonoids (>1.4%) and tannins (BPOM, 2004). Tannin compounds (polyphenols) can inhibit growth and kill bacteria by reacting with the cell membrane (Volk and Wheller, 1993). Tannins extracts from guava leaves can inhibit the growth of E. coli, Pseudomonas aureginosa, Staphilococcus aureus, Aspergillus niger and Candida albicans (Mailoa et al., 2014).

Some authors reported positively for P. guajava leaf extract in hyperactive gut disorders which has been supported by the present study (De Wet et al., 2010). In addition, it also reported that ethanol extract of guava leaf protected diarrhoea up to level of 55.6% (Porwal et al., 2012). These results agreed with similar reports which have established reduction in gastric motility as being the mechanism by which many anti-diarrheal agents act (Ezekwesili et al., 2010).

On the other hand, some researchers Rattanaphol and Rattanaphol (2009) and Wedy (2012) declared that use of 0.04% or 0.06% of guava leaves extract in poultry ration didn’t have significant effect on BW and weight gain. This may be related to the low guava leaves extract or the type of extract.

**Carass traits:**

Percentages of carcass and liver significantly (P<0.05) increased, while percentages of abdominal fat, stomach, small intestine and caecum by supplementing guava leaves extract at levels of 2 and 3 ml/kg diet in G3 and G4, respectively. Percentages of giblet and TEP significantly (P<0.05) increased, while GIT significantly (P<0.05) decreased in all treatment groups. However, percentages of kidney and heart were not affected significantly by treatment (Table 3).

Concerning the chemical analysis of meat, guava leaves extract at levels of 2 and 3 ml/kg diet in G3 and G4 significantly (P<0.05)& P<0.01, respectively) increased DM and CP contents and decreased EE content, while ash content was not affected by treatment (Table 3). It is of interest to note that reducing EE content in rabbit meat was in association with decreasing abdominal fat percentage, reflecting positive effect of guava leaves extract on reducing body fat.
The results of Mahmoud et al. (2013) showed that fat content of broiler was decreased significantly by supplementation of guava leaf meal (2.5-4.5%) in broiler ration. Also, El-Deek et al. (2009) noticed that broiler receiving 8% raw or treated guava by-product had significantly less abdominal fat than any other dietary levels or the control.

In accordance with the present results on meat composition, Medina et al. (2006) mentioned that 0.04% or 0.06% of guava leaves extract had significant effect on meat composition. Also, Mahmoud et al. (2013) revealed that dietary supplementation of 1% dried guava leaves in diets of broiler chicks significantly increased DM and decrease EE of both breast and thigh meat.

Blood parameters:

Plasma total proteins concentration was not affected significantly by guava leaves extract treatment. Both guava leaves extract levels in G3 and G4 significantly (P<0.05) decreased triglycerides, total cholesterol and LDL levels, while increased HDL level in blood plasma (Table 4). The observed reduction in plasma lipid profile in rabbits is in agreement with the results of Mahmoud et al. (2013), who revealed that dietary supplementation of 1% dried guava leaves in diets of broiler chicks significantly (P>0.05) decreased level of lipids metabolites except for LDL. Also, Crespo and Esteve-Garcia (2002) showed that psidium guava extract administration to broiler diet could decrease triglycerides, cholesterol, and LDL, while increased HDL. Triglycerides are secreted from the liver into the blood by triglyceride-rich lipoproteins. The pronounced effect of guava extract administration on lipid profile may be attributed to impaired hepatic lipogenesis leading to decreased triglycerides concentrations in blood plasma (Bölükbaş and Erhan, 2007).

Table (3). Effect of dietary guava extract level on carcass traits of growing rabbits.

| Parameter (%) | G1     | G2     | G3     | G4     | SEM | P-value |
|---------------|--------|--------|--------|--------|-----|---------|
| Carcass       | 50.1 b | 51.2 b | 53.7 b | 54.4 b | 0.382 | 0.0002  |
| Liver         | 3.13 b | 3.31 b | 3.68 a | 3.77 a | 0.060 | 0.0008  |
| Kidney        | 0.54   | 0.58   | 0.58   | 0.59   | 0.012 | 0.4318  |
| Heart         | 0.69   | 0.74   | 0.74   | 0.74   | 0.046 | 0.8262  |
| Giblets       | 4.36 b | 4.63 b | 5.01 b | 5.10 b | 0.062 | 0.0002  |
| Total edible parts (TEP) | 54.5 b | 55.9 b | 58.7 b | 59.5 b | 0.368 | 0.0001  |
| Abdominal fat | 1.22 a | 1.10 b | 0.87 c | 0.65 b | 0.068 | 0.0167  |
| Gastrintestinal tract (GIT) | 22.9 a | 21.3 b | 19.1 c | 18.9 b | 0.300 | 0.0002  |
| Stomach       | 4.13 a | 3.83 b | 3.51 b | 3.37 c | 0.082 | 0.0041  |
| Small intestine | 3.81 a | 3.72 a | 3.52 b | 3.41 b | 0.040 | 0.0022  |
| Caecum        | 4.72 a | 4.54 a | 4.28 b | 4.13 b | 0.084 | 0.0355  |
| Meat chemical analysis (%): Moisture | 74.2 a | 74.0 b | 73.5 b | 73.4 b | 0.214 | 0.0477  |
| Ash           | 1.59   | 1.55   | 1.53   | 1.50   | 0.030 | 0.3793  |
| CP            | 21.1 b | 21.6 b | 22.4 a | 22.5 a | 0.180 | 0.0040  |
| EE            | 3.09 b | 2.80 b | 2.63 b | 2.62 b | 0.097 | 0.0201  |

SEM = Standard error of mean, a, b, c, Means in the same row with different superscript are significantly different at P<0.05.

Table (4). Effect of dietary guava extract level on blood biochemicals of growing rabbits.

| Nutrient              | G1   | G2   | G3   | G4   | SEM   | P-value |
|-----------------------|------|------|------|------|-------|---------|
| Total proteins (g/dl)  | 5.52 | 5.72 | 6.03 | 6.16 | 0.164 | 0.0773  |
| Triglycerides (mg/dl)  | 91.7 a| 90.5 ab| 88.9 bc| 87.3 c | 0.693 | 0.0121  |
| Total cholesterol (mg/dl)| 80.6 a| 79.1 ab| 77.3 bc| 75.8 c | 0.721 | 0.0039  |
| HDL (mg/dl)           | 30.8 b | 31.6 ab | 33.4 a | 33.5 a | 0.500 | 0.0278  |
| LDL (mg/dl)           | 44.8 a | 43.7 ab | 41.5 bc| 40.6 c | 0.889 | 0.0308  |
| TAC (mmol/l)(1)       | 1.23 c | 1.35 bc | 1.53 ab| 1.65 a | 0.071 | 0.0140  |
| MDA (µmol/ml)(2)      | 1.23 c | 1.14 ab | 1.04 b | 0.99 b | 0.046 | 0.0238  |

SEM = Standard error of mean, a, b, c, Means in the same row with different superscript are significantly different at P<0.05.
(1) TAC=total antioxidants capacity,
(2) MDA= malondialdehyde
Results of antioxidant capacity (Table 4) revealed significant P<0.05) increase in total antioxidant capacity (TAC) and significant decrease in malondialdehyde (MDA) in G3 and G4, which may suggest antioxidant property of guava extract at these levels via increasing antioxidant defense system, decreasing lipid peroxidation and reactive oxygen species (ROS) generation. Role of guava extract as a natural antioxidant was explained by Ramadan et al. (2009), who revealed that administration of aqueous guava extract (1g/dl) to streptozotocin (STZ) induced diabetic rats for 4 weeks, enhanced most of the endogenous antioxidant enzymes activity as glutathione reductase, superoxide dismutase and TAC. They added that the potential antioxidant and hypoglycemic activities of guava leaves extract, respectively, are attributed to the presence of relatively high percentage of phenolic compounds (456±10.4 mg gallic acid equivalent/l) and other active volatile compounds with high antioxidant activity.

Although, Mahmoud et al. (2013) revealed that dietary supplementation of 1% dried guava leaves in diets of broiler chicks significantly increased plasma total protein, the present results showed no effect of guava extract on total proteins concentration in rabbits.

**Blood hematological values:**

Haemoglobin (Hb) concentration, package cell volume (PCV) and count of red blood cells (RBC's) and platelets were not affected significantly by treatment. Only white blood cells (WBC's) significantly (P<0.05) decreased by all dietary guava leaves extract treatments as compared to control. Also, heterophils percentage was affected significantly by guava leaves extract treatment at levels of 2 and 3 ml/kg diet, being lower (P<0.05) in G3 and G4 than in G1 and G2. Reducing WBCs count may indicate improving immune response of rabbits as affected by treatment. However, decreasing heterophils percentage was in association with insignificant increase in monocytes, basophils and eosinophils percentage in G3 and G4 (Table 5).

**Table (5). Effect of dietary guava extract level on hematological parameters of growing rabbits.**

| Parameter               | G1   | G2   | G3   | G4   | SEM  | P-value |
|-------------------------|------|------|------|------|------|---------|
| Hemoglobin (g/dl)       | 10.9 | 11.1 | 11.4 | 11.4 | 0.379| 0.4735  |
| PCV (%)                 | 35.0 | 36.1 | 37.2 | 37.4 | 0.578| 0.0824  |
| RBCs (x10³/µl)          | 5.11 | 5.27 | 5.48 | 5.46 | 0.135| 0.1096  |
| Platelets (x10³/µl)     | 412.0| 439.7| 459.0| 482.0| 15.50| 0.0920  |
| WBCs (x10³/µl)          | 7.93a| 5.57b| 5.23b| 5.10b| 0.291| 0.0119  |
| WBCs fractionation (%)  |      |      |      |      |      |         |
| Heterophils             | 29.3a| 28.7b| 27.3b| 27.0b| 0.336| 0.0113  |
| Lymphocytes             | 62.7 | 62.0 | 60.7 | 60.0 | 0.577| 0.0579  |
| Monocytes               | 4.00 | 4.0  | 6.3  | 6.7  | 0.882| 0.1009  |
| Basophils               | 3.00 | 3.7  | 4.0  | 4.3  | 0.577| 0.2970  |
| Eosinophils             | 1.00 | 1.6  | 1.7  | 2.0  | 0.333| 0.3493  |

SEM = Standard error of mean,  
a, b, Means in the same row with different superscript are significantly different at P<0.05.

It is worthy noting that there was tendency of increasing Hb, PCV, RBCs and platelets in treatment groups, but all values are within the normal range of rabbits (Moore et al., 2015). In accordance with improving haematological parameters of rabbits in treatment groups, Ali and Shamsuzzaman (1996) found positive effects of supplementing guava leaves on broilers immunity, which may be due to the presence of flavonoids, which derivatives have been found to inhibit the growth of Staphylococcus aureus.

The observed tendency of increase in PCV may suggest the save use of guava extract on health status of growing rabbits. Reduction in the concentration of PCV in the blood may suggest the presence of a toxic factor (e.g. haemagglutinin) which had adverse effect on blood formation (Oyawoye and Ogunkunle, 1998). Lectins in guava were shown to bind to E. coli preventing its adhesion to the intestinal wall and thus preventing infection (Okemo et al., 2001). This was proved in term of decreasing mortality rate of rabbits in G3 and G4. Moreover, decreasing WBCs count may indicate decreasing stress condition of rabbits. The total count of WBCs may be increased by 15 to 30% in rabbits under stress conditions (Campbell, 2004 and Poljičak-Milas et al., 2009).

**Economic feed efficiency:**
Although the price of supplemented diets increased, total feed cost slightly decreased in diets of treatment groups, as a result of decreasing average feed intake (kg/head) as compared to control. Selling price of supplemented groups increased due to increased average weight gain. Net selling price increased as a result of increasing viability rate in treatment groups. These findings were reflected in higher net revenue and relative revenue (Table 6). This means that diets by supplemented with guava leaves extract in diets showed higher economic feed efficiency, being the highest in rabbits fed diet supplemented with guava leaves extract at a level of 2 or 3 ml/kg diet.

Table (6). Effect of dietary guava extract level on economic feed efficiency of growing rabbits.

| Parameter                        | G1      | G2      | G3      | G4      |
|----------------------------------|---------|---------|---------|---------|
| Average feed intake (kg/head)    | 5.113   | 5.044   | 5.011   | 4.993   |
| Price /kg diet (L.E.)            | 3.95    | 3.98    | 4.01    | 4.04    |
| Total feed cost (L.E.)           | 20.20   | 20.08   | 20.09   | 20.17   |
| Average weight gain (kg/head)    | 1.486   | 1.551   | 1.644   | 1.659   |
| Selling price (L.E.)<sup>(1)</sup> | 44.58   | 46.53   | 49.32   | 49.77   |
| Viability rate                   | 90      | 90      | 100     | 100     |
| Net selling price (L.E.)<sup>(2)</sup> | 40.12   | 41.88   | 49.32   | 49.77   |
| Net revenue (L.E.)<sup>(3)</sup> | 19.92   | 21.80   | 29.23   | 29.60   |
| Relative revenue (%)             | 100     | 109.4   | 146.7   | 148.6   |

Other conditions like management are fixed.
(1) Price of kg live body weight was 30 L.E according to marketing price 2018.
(2) Net selling price = selling price x viability rate
(3) Net revenue = Selling price – total feed cost

CONCLUSION

Guava leaves extract could be successfully incorporated into the diet of growing rabbits up to 3.0 ml/ kg diet, which improved production performance without adverse effects on health status during growing period, under Egyptian environmental conditions.

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تأثر اضافة مستخلص أوراق الجوافة إلى علاق الأرانب النامية على الإداء الانتاجي وقياسات الدم وصفات الذبحة.

وايل عوض محمود مرسي و جورج عزت يونان و هدي السيد الجابري
معهد بحوث الإنتاج الحيواني، مركز بحوث الزراعية، الدقي، مصر.

تهدف الدراسة الحالية إلى تقييم اضافة مستخلصات مختلفة من المستخلص الكحولي لأوراق الجوافة (باثول) في العلقة على الإداء الانتاجي وقياسات الدم وصفات الذبحة. تم تغميم عدد 80 من الأرانب الأدري عمر خمسة أسابيع إلى أربع مجموعات مماثلة. أوراق سليمة تم فصلها داخل حاوية مغلقة تحتضن 20 أرنب، ووزن كل منها من متوسط وزن 7.12 ± 525 جرام. تم تغذية المجموعة الأولى على علقتهم مكمل، والثانية على نفس العلقة بالمجموعة الأولى مضافًا إليها مستخلص أوراق الجوافة على مستوى 1، 2، 3 مل/كم/جم علقة. أمرت المطاردة النتائج الآتية:

1. الأراب المغذى على 1 و 2 و 3 مل مستخلص أوراق الجوافة لكل كيلوجرام علف سجل معدلن أعلى وزن جسم نهائي عن تلك المغذى على العلبقة الكنترول بمقدار 3.1 و 7.7 و 8.5.
2. عدم وجود اختلافات معنوية في العلقة المستقلك (جرام/يوم/أرنب). نتيجة استخدام مستخلص أوراق الجوافة في العلقة.
3. لوحظ تحسن معنوي في معدل التحويل الغذائي بزيادة مستوي مستخلص أوراق الجوافة في العلقة.
4. تم تسجيل الأراب المغذى على المستويات المرتفعة من مستخلص أوراق الجوافة (2 و 3 مل لكل كيلوجرام علف) أي نفوذ مقارنة بنمل المغذى على العلبقة الكنترول أو المعضوب البالغ 1 مل لكل كيلوجرام علف (10%).
5. تحسنت بشكل معنوي نسبة تصاص الذبحة بزيادة مستوي مستخلص أوراق الجوافة في العلقة.
6. سجلت الأراب المغذى على 2 و 3 مل مستخلص أوراق الجوافة لكل كيلوجرام علف أعلى عائد التصاص نسب (146.7 و 148.6) مقارنة بنمل المغذى على العلبقة الكنترول (100%).

خلصت الدراسة المقدمة إلى أن اضافة مستخلص أوراق الجوافة إلى علقة الأرانب النامية حتى 3 مل لكل كيلوجرام علف يحسن من الإداء الانتاجي بدون أي تأثيرات سلبية على الحالة الصحية خلال فترة النمو وذلك تحت ظروف البيئية المصرية.