J. Meat Sci. 2023, 18(2): 1-8

Research Article

ACS Publisher
www.acspublisher.com

Journal of Meat Science

Year 2023 (December), Volume-18, Issue-2

ISSN 0975-5209 **(Print)**
ISSN 2581-6616 **(Online)**

Influence of Mannan oligosaccharides and Tulasi (*Ocimum sanctum*) on Carcass and Meat Quality Characteristics of Rabbits

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ARTICLE INFO

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Received 05-10-2023; Accepted 14-11-2023

DOI: 10.48165/jms.2023.18.02.01

ABSTRACT

The present study was conducted with twenty-four New Zealand white male rabbits weighing around 580 g that were assigned into four homogeneous treatment groups randomly (C, T1, T2 and T3) each with six rabbits. The rabbits fed with basal diet (without any antibiotic, coccidiostat or growth promoting supplements) was grouped as control C; basal diet mixed with the prebiotic mannan oligo saccharide (MOS) (1.0 g/ kg feed) was grouped as T1; basal diet mixed with the antibiotic oxytetracycline hydrochloride powder @ 250 g/tone of feed was grouped as T2 and basal diet mixed with the herbal powder tulasi (*Ocimum sanctum*) leaf powder (TLP) @ 50g/kg feed was grouped as T3 and the trial was conducted for a period of 42 days. Rabbits fed with TLP @ 50g/kg feed (T3) had significantly ($P<0.05$) higher pre slaughter weight, hot carcass weight, dressing per centage, meat bone ratio, muscle per cent and bone per cent than rabbits fed with control feed and MOS and antibiotic supplemented feed. Addition of different dietary supplements did not significantly ($P>0.05$) influenced the carcass length of rabbits. Addition of tulasi leaf powder in the rabbit diet significantly ($P<0.05$) recorded better physico-chemical attributes like lower drip loss and higher extract release volume, water holding capacity and cooking yield, higher moisture and protein content than remaining formulations. Meat obtained from rabbits fed with tulasi leaf powder had significantly ($P<0.05$) superior sensory scores than meat obtained from rabbits fed with remaining formulations. Based on the results, it can be concluded that addition of tulasi leaf powder @50 g/kg feed lead to better carcass characteristics and meat quality attributes to commercial broiler rabbits.

Key words: Rabbits, Prebiotics, Tulasi leaf powder, Carcass characteristics, Meat quality attributes.

INTRODUCTION

Rabbits (*Oryctolagus cuniculus*) are herbivorous animals, termed as pseudo-ruminants and fall in between ruminants and monogastric animals. They convert 20% of the protein in their food in to edible meat, which is next to poultry (23%) and more than that of pigs (16%) and beef (8-12%) (Basavaraj et al. 2011). They are well known for their short gestation period, highest prolificacy, better utilization of low grain and fibre rich feed stuffs, efficient feed conversion ratio, outstanding growth rate with requirement of less space and low capital investment. New Zealand white breed of rabbits are being maintained as domestic animals owing to their traits such as body form, white fur, attractive and appealing demeanor. Many growth promoters are extensively used in the livestock to attain better growth in shorter duration. The common additives that are used growth promoters through dietary supplementation are prebiotics, growth promoting antibiotics and phytogenic/ herbal compounds. Consumer preferences for "natural" products have resulted in increased interest in the use of natural feed additives in the animal rearing systems and usage of antioxidants including rosemary, sage, aloe vera, mustard, tea catechins, whey protein concentrate, and cottonseed meals in the product processing (Bhaskar Reddy et al. 2013).

Mannan oligosaccharides (MOS) are a group of prebiotics produced from the outer cell wall of yeast *Saccharomyces cerevisiae* which are made up of the mannan element, that protect the intestinal mucosal receptors by washing out the harmful pathogens resulting in optimum growth and weight gain of the animals (Abdel-Hamid and Farahat 2015 and Ayyat et al. 2018). The antibiotic oxytetracycline acts by interfering with bacteria's ability to manufacture vital proteins. Bacteria cannot grow, proliferate or multiply in numbers without these proteins. As a result, oxytetracycline stops the illness from spreading and the remaining bacteria are either eliminated by the immune system or die (Kahsay et al. 2013). Phytogenic feed additives serve to improve the flavour, taste and feed utilization and there by animal performance (Krieg et al. 2009; Karaskova et al. 2015). Tulasi is one of the herbal ingredients added to the diets for better growth by reducing the oxidative stress in broiler chicken (Shaik Khadeer Basha et al. 2023). The active ingredient eugenolin tulasi was demonstrated to have significant antioxidant properties and effectively reduced lipid peroxidation (Sethi et al. 2004). Further, globally, the emerging trends of dietary interventions have brought a radical transformation in the arena of nutrition and health (Bhaskar Reddy et al. 2009). The modification of the ratio of fatty acids in meat products through dietary interventions and also achieved by replacement of animal fat with vegetable oils as vegetable oils were a rich source of PUFAs in animal managemental systems (Bhaskar Reddy et al. 2022).

The studies assessing the effects of prebiotic, antibiotic and herbal compounds on carcass and meat quality characteristics in broiler New Zealand white rabbits have not been undertaken. Hence, the present research work was designed to evaluate the effects of dietary supplementation of prebiotic (mannan oligosaccharides), antibiotic (oxytetracycline) and herbal (Tulasi) leaves powder (TLP) feed additives in New Zealand white rabbits and evaluated their efficacy on carcass and meat quality attributes.

MATERIAL AND METHODS

Procurement of ingredients

The weaned male NewZeland white rabbits at the age of 30 days were procured from M/S Sri Sairam Rabbit Farming Pvt Limited, Krishnagiri, Tamil Nadu, India. Prebiotic MOS was procured in the form of powder from Jilariya Chemphar Company, Gujarat and antibiotic oxytetracycline powder was procured from Medibios Laboratories Ltd., Thane. Tulasi leaves were collected freshly from local gardens and thoroughly washed, shade dried and made it into powder. The basal ration used for the experiment was procured from VRK Nutritional Solutions, Pune, Maharashtra.

Experimental design

The experiment was conducted with twenty-four New Zealand white male rabbits weighing around 580 g that were assigned into four homogeneous treatment groups randomly (C, T1, T2 and T3) each with six rabbits. The trail was conducted for a period of 42 days (6 weeks) in order to investigate the efficacy of dietary supplementation of prebiotic, antibiotic and herbal supplementation on carcass and meat quality attributes of Newzeland white rabbits. The rabbits fed with basal diet (without any antibiotic, coccidiostat or growth promoting supplements) were grouped as control; basal diet mixed with the prebiotic @ mannan oligo saccharide (1.0 g/kg feed) grouped as T1; basal diet mixed with the antibiotic oxytetracycline hydrochloride powder @ 250 g/tone of feed was grouped as T2 and basal diet mixed with the herbal powder Tulasi leaf powder @ 50g/kg feed was grouped as T3. Rabbits were kept under the same managerial, hygienic and environmental conditions. All the experimental rabbits were healthy and clinically free from internal and external parasites. Rabbits were provided with *ad libitum* feed and water individually.

Carcass Characteristics

Pre-slaughter Weight

At the end of the feeding trail, animals were weighed individually before the slaughtering procedure by using electronic weighing balance.

Slaughter of Rabbits

The rabbits were off-fed for 24 hours prior to slaughter and provided with *ad libitum* water. Slaughtering and dressing of rabbit is done by dislocation of the neck followed by bleeding. The rabbits were held firmly by the rear leg and head stretching it to full length. The head was then bent backwards with a hard sharp pull to dislocate the neck. After the dislocation, the head was severed to allow complete bleeding by hanging the rabbit upside down. The forefeet were then removed. Carcasses were dressed and eviscerated as per the standard procedure. After bleeding was completed, skin was removed. The animals were dressed packer style with head and legs removed, while retaining with the carcass leaf fat and kidneys. Evisceration was done by removing intestines, stomach, liver, heart, lungs, bladder and spleen. After the carcass is completely dressed, it was then split longitudinally into two halves and weights of two halves were recorded as hot carcass weight (HCW) in kgs. Dressing per cent was calculated as follows: (hot carcass weight/pre-slaughter weight) X 100. The length of the carcass was recorded as a distance from the posterior edge of the first rib to the anterior edge of the aitch bone in cm. The lean/muscle portion, bones and fats separated manually from the carcasses and weighted individually and observations were recorded. The ratio of meat to bone was calculated.

Meat Quality Attributes

The pH of meat samples was determined by homogenizing 10 g of fresh and stored / refrigerated meat sample with 50 ml distilled water with the help of tissue homogenizer (Daihan Scientifics, Wise Mix, HG-15D, Korea) for 1 min. The pH of suspension was recorded by immersing the combined glass electrode of digital pH meter (Systronics μ pH system 361, Model: 7856, Type 361) which was calibrated against buffer of pH 4, 7 and 10. For drip loss, a slice of meat sample (approximately 40 g) was weighed, kept in a plastic bag and placed in a refrigerator at 4°C then reweighed after 24 hr to calculate drip loss (Honikel 1998) and expressed as percentage. The standard ERV method was performed as per Pearson (1968) by homogenizing 25 g of fresh rabbit meat sample in 100 ml phosphate buffer (pH 5.8) for 2 min followed by pouring the homogenate into a funnel equipped with Whatman no. 1 paper and duplicates also taken as same. The average ml of extract that passed through the filter paper in 15 min at room temperature was recorded as ERV and expressed in ml. Water-holding capacity (WHC) was determined according to Wardlaw et al. (1973). The 20 g of finely chopped meat sample was placed in a centrifuge tube containing 30 ml NaCl (0.6 M) and was stirred with glass rod for 1 minute. The tube was then kept at refrigeration temperature (4 ± 1°C) for 15 min, stirred again and centrifuged at 3000 rpm using refrigerated centrifuge (REMI R-8C, Serial no: JGLC-12753, Remi Elektrotechnik Limited, Vasai, India) for 15 min. The supernatant was measured and amount of water retained by samples were expressed as WHC in percentage. The weight of samples was recorded before (raw weight) and after cooking of product and the difference was multiplied by 100 and expressed the cooking yield as per centage. The moisture content was determined by hot air oven drying, protein by automatic Kjeldahl method, fat by Soxhlet extraction with petroleum ether and ash in muffle furnace as described in AOAC (2002). The cooked rabbit meat samples were served to trained panelists and evaluated for appearance, flavour, tenderness, juiciness, mouth coating and overall palatability using a 8-point descriptive scale (where, 8=extremely desirable, 1= extremely undesirable) as described by Keeton (1983) with slight modifications. Sensory evaluation conducted between 3.30-4.00 PM and filtered potable water was provided to the panelists for rinsing their mouth in between evaluation of different samples.

Statistical Analysis

The obtained data were subjected to analysis of variance, (one way ANOVA) (Snedecor and Cochran 1995) and Duncan's multiple range test used for comparing the means to find the difference between groups and their interaction for various parameters in different experiments. The smallest difference (D 5%) for two means to be significantly different ($P < 0.05$) was reported.

RESULTS AND DISCUSSION

Carcass Characteristics

Different dietary supplements significantly ($P<0.05$) influenced the carcass characteristics of rabbits (Table 01). In the present study, rabbits supplemented with TLP showed significantly ($P < 0.05$) higher pre slaughter weight compared to rabbits fed with other dietary formulations. The range of pre slaughter weight (kg) of rabbits was recorded from 1.86 to 2.34. Rabbits fed with MOS had significant

(P<0.05) higher pre slaughter weight than rabbits fed with control feed and antibiotic powder added feed. The higher pre slaughter weight attained with the supplementation of TLP in the present study might be due to active principles of TLP, which improved taste and flavour thereby improved digestion, intestinal health and allowing efficient utilization and absorption of nutrients (Karaskova et al. 2015, Lavanya et al 2023a and Bhaskar Reddy et al. 2023). Similar to these results, Swathi et al. (2012) reported a significantly higher final body weight with supplementation of 0.25% and 0.5% of tulasi in heat stressed broiler chicken and Buba et al. (2016) found higher body weights of rabbits with dietary inclusion of tulasi @ 4g/kg feed. Rabbits supplemented with TLP (T3) had significantly (P < 0.05) higher hot carcass weight than rabbits fed with remaining formulations. The higher hot carcass weight might be related directly to the pre-slaughter weight obtained. Increase in hot carcass weight in T3 group of rabbits might be due to active constituents of tulasi reported to possess growth promoting activity in terms of muscle deposition (Rukmini and Vijayarahhavan, 1980). The results are similar to Belal et al. (2018) who observed that supplementation of ginger had significantly higher carcass weight compared to control.

Addition of TLP in the rabbit feed exhibited significantly (P<0.05) higher dressing percentage compared to rabbits fed with control diet, antibiotics and prebiotics. The range of dressing per cent in rabbits was between 47.85 to 50.85. The higher dressing per cent in rabbits supplements with TLP is mainly due to anti-inflammatory, cholagogic, diastolic, anti-allergic, stimulates gastric and intestinal juice secretion and several other important actions of active compounds in the TLP which consequently led increased feed conversion and higher weight gain and subsequently higher dressing percent in rabbits.

The results were in accordance with Mahmood et al. (2015) who also found an increase in dressing percentage of the broiler chicken fed with *Trigonella foenum graecum*. Rabbits supplemented with TLP, antibiotics and prebiotics through feed did not significantly (P>0.05) influenced the carcass length. Minor variations were found in the carcass length of rabbits fed with dietary supplements but these are not statistically significant. The changes in linear body measurements are indicator of tissue growth and tend to increase as the animal grows (Sungirai et al. 2014). The results imply that supplementation of herbal supplementations are efficacious to improve tissue growth in the rabbits. Addition of TLP and MOS significantly (P<0.05) increased the meat bone ratio of rabbits compared to rabbits fed with control diet. Rabbits supplemented with TLP had significantly (P 0.05) higher meat bone ratio compared to rabbits supplemented with other diets**.** The increment in meat bone ratio might be due to effective digestive tract function of rabbits due to TLP constituents which led more efficient digestion of nutrients consequently higher lean and muscle proportion (Gupta et al. 1990). The results obtained in the study were similar to Yusuf et al. (2014) who observed increase in meat:bone ratio in goats fed with leaves or whole parts of *Andrographis paniculata*. Rabbits supplemented with dietary formulations showed significantly (P<0.05) higher muscle per cent and lower fat per cent than meat obtained from rabbit fed with control diet. The higher muscle per cent in T3 rabbits might be due myogenesis effect of TLP active principles (Bhaskar Reddy et al. 2023). Further, the lower fat per cent might be due to decreased lipogenesis, stimulation of lipolysis, reduced viability of adipocytes and proliferation of preadipocytes, suppressed adipocyte differentiation and triglyceride accumulation, stimulation of fatty acid β-oxidation, and

Table. 1: Mean ± S.E values of carcass characteristics of rabbits influenced by dietary supplements.

Carcass Characteristics	Control	T1	T2	T3
Pre-slaughter weight (kg)	1.86^{a} ± 0.14	2.19^{b} ± 0.07	2.15^{b} ± 0.05	2.34^{c} ± 0.01
Hot carcass weight (kg)	0.89^{a} ± 0.07	1.09^{b} ± 0.31	1.05^{b} ± 0.18	1.19^{c} ± 0.24
Dressing per cent	47.85^{a} ± 0.16	49.77^{b} ± 0.57	48.84^{c} ± 0.30	50.85^{d} ± 0.35
Carcass length (cm)	33.45 ± 0.31	33.78 ± 0.18	33.18 ± 0.22	34.09 ± 0.06
Meat bone ratio	3.95^{a} ± 0.62	4.34^{c} ±0.23	4.18^{b} ±0.19	4.41^{d}±0.57
Muscle (%)	60.98^{a} ± 0.61	69.92^{c} ±0.19	66.79^{b} ± 0.28	71.57^{d} ± 0.30
Bone (%)	15.44^{a}±0.46	16.11^{bc}±0.20	15.98^{b}±0.38	16.23^{d}±0.14
Visceral fat (%)	1.61^{d}±0.02	1.50^{b}± 0.08	1.65^{c}± 0.18	1.31^{a}± 0.05

^{abcd} Means bearing different superscripts in a row differ significantly (<0.05).
Mean is average of six replications.
C=Rabbits fed without any prebiotics and herbal supplementation (Control).
T1 = Rabbits supplemented with prebiotic- mannan oligo saccharide @ 1.0 g/ kg feed.
T2 = Rabbits supplemented with oxytetracycline hydrochloride powder @ 250 g/tone of feed
T3 =Rabbits supplemented with Tulasi leaf powder @ 50g/kg feed

reduced inflammation (Wang et al. 2014 and Lavanya et al 2023b) properties of different active constituents of TLP.

Physico-chemical characteristics

The influence of dietary supplements on various rabbit meat quality attributes like pH, ERV, drip loss, water-holding capacity (WHC) and cooking yield are tabulated in Table 02. In the present study, addition of different dietary supplements did not significantly (P>0.05) influence the pH of rabbit meat. Meat obtained from rabbits supplemented with TLP (T3) showed significantly (P<0.05) lower drip loss compared to meat obtained from rabbits fed with control diet. The decrease in drip loss in rabbit meat obtained from rabbits fed with TLP might be due to higher water holding capacity of muscle proteins compared to rabbit meat obtained from rabbits fed with control diet and also found that an inverse relationship between water holding capacity and drip loss of meat from rabbit meat obtained from control and treated rabbits. Meat obtained from rabbits supplemented with TLP (T3) had significantly (P<0.05) higher ERV and water holding capacity (WHC) values than meat obtained from remaining treatments. Good quality meat with a relatively low bacterial count releases large volumes of extract and will have higher water holding capacity (WHC) (Jay 1965). The presence of antioxidants in the TLP counters the negative effect of free radicals in the biological systems which positively influenced the WHC of muscle system (Lawrie and Ledward 2006). The present findings are in congruent with Killi et al. (2015) who observed that higher ERV was in all the groups supplemented with neem, spirulina and their combination compared to control groups in broilers. Meat obtained from rabbits supplemented with dietary formulations through feed showed significantly (P<0.05) higher cooking yield compared to rabbit meat obtained from rabbits supplemented with control diet. The higher cooking yield might be due to reduction in the oxidation of membrane lipids and proteins and improving the integrity of those membranes and thereby reducing the water exudates and increasing the water binding capacity of muscles during cooking. The results obtained in the study are in congruent to Perna et al. (2019) who observed that supplementation of cauliflower leaf powder showed a lower cooking loss of rabbit meat compared to control group and Bhaskar Reddy et al. (2021) in different varieties of chicken.

Proximate Composition

Different dietary supplements significantly (P<0.05) influenced the proximate composition of rabbit meat and the results were presented in Table 03. Meat obtained from rabbits fed with antibiotic (T2) had significantly (P<0.05) lower moisture content than meat from rabbits fed with dietary formulations. Meat from rabbits supplemented with TLP (T3) had significantly (P < 0.05) higher moisture and protein content and lower fat content than meat obtained from control diet and other dietary formulations. There was no significant (P>0.05) difference found in the protein content of meat obtained from rabbits fed with prebiotic (T1) and TLP (T3). In respect to total fat content, meat obtained from rabbits supplemented with TLP (T3) had significantly (P<0.05) lower fat content than meat obtained from control diet and other dietary formulations. The higher moisture (%) in meat from rabbits fed with dietary formulations might be due to higher WHC and lower drip loss in the muscles compared to control rabbit meat. The variations in protein content might be due to reduction of fatty acid synthesis by TLP, which would decrease fat accumulation and increase the protein deposition (Chang and Johnson, 1980). Similar to these findings, Ahmed et al. (2016) observed the effects of dietary herbs in finisher rabbit and the results showed no significant (P>0.05) difference in proximate composition of meat.

Table 2: Mean ± S.E values of physico-chemical characteristics of meat obtained from rabbits fed with dietary supplements.

Meat Quality Attributes	Control	T1	T2	T3
pH	5.63± 0.23	5.59± 0.11	5.61± 0.03	5.55^{b}± 0.07
Drip loss (%)	2.98^{d} ± 0.15	2.36^{b} ± 0.04	2.68^{c} ± 0.20	2.19^{a} ± 0.09
Extract release volume (ml)	26.11^{a}± 0.20	31.10^{c}± 0.15	28.09^{b}± 0.19	32.78^{d} ± 0.26
WHC (%)	28.48^{a}± 0.43	33.19^{c}± 0.26	29.56^{b}± 0.67	35.10^{d}± 0.30
Cooking Yield (%)	79.24^{a}± 0.67	82.68^{c}± 0.52	80.79^{b}± 0.29	83.54^{d}± 0.16

^{abcd} Means bearing different superscripts in a row differ significantly (P < 0.05).
Mean is average of six replications.
C=Rabbits fed without any prebiotics and herbal supplementation (Control).
T1 = Rabbits supplemented with prebiotic-mannan oligo saccharide @ 1.0 g/ kg feed.
T2 = Rabbits supplemented with oxytetracycline hydrochloride powder @ 250 g/tone of feed
T3 =Rabbits supplemented with Tulasi leaf powder @ 50g/kg feed

Table 3: Mean ± S.E values of proximate composition of meat obtained from rabbits fed with dietary supplements.

Proximate composition	C	T1	T2	T3
Moisture (%)	71.63^{b}±0.26	72.90^{c}±0.19	70.25^{a}±0.57	72.89^{c}±0.33
Protein (%)	20.09^{a}±0.15	22.82^{c}±0.22	20.36^{b} ±0.09	22.75^{c}±0.20
Fat (%)	4.15^{d}±0.10	3.60^{b}±0.34	3.98^{c}±0.28	3.29^{a}±0.65

^{abcd} Means bearing different superscripts in a row differ significantly (P < 0.05).
Mean is average of six replications.
C=Rabbits fed without any prebiotics and herbal supplementation (Control).
T1 = Rabbits supplemented with prebiotic-mannan oligo saccharide @ 1.0 g/ kg feed.
T2 = Rabbits supplemented with oxytetracycline hydrochloride powder @ 250 g/tone of feed
T3 =Rabbits supplemented with Tulasi leaf powder @ 50g/kg feed

Table 4: Mean ± S.E values of sensory scores of meat obtained from rabbits fed with dietary supplements.

Sensory Characteristics	Control	T1	T2	T3
Appearance	7.09^{a} ±0.36	7.20^{b} ±0.17	7.14^{ab}±0.15	7.24^{bc}±0.18
Flavour	7.05^{a} ±0.30	7.25^{b} ±0.15	7.10^{ab} ±0.18	7.40^{c} ±0.06
Tenderness	7.10^{ab}±0.12	7.22^{c} ±0.37	7.03^{a} ±0.30	7.34^{d}±0.42
Juiciness	7.04^{a}±0.05	7.28^{c}±0.17	7.11^{ab}±0.12	7.30^{c}±0.28
Overall acceptability	7.07^{a}±0.16	7.29^{b}±0.10	7.11^{a}±0.18	7.35^{b}±0.25

^{abcd} Means bearing different superscripts in a row differ significantly (P < 0.05).
Mean is average of six replications.
C=Rabbits fed without any prebiotics and herbal supplementation (Control).
T1 = Rabbits supplemented with prebiotic-mannan oligo saccharide @ 1.0 g/ kg feed.
T2 = Rabbits supplemented with oxytetracycline hydrochloride powder @ 250 g/tone of feed
T3 =Rabbits supplemented with Tulasi leaf powder @ 50g/kg feed

Sensory Characteristics

The influence of different dietary feed supplements on sensory scores of rabbit meat samples were presented in Table 04. Addition of herbal formulations significantly (P<0.05) influenced the sensory scores of cooked rabbit meat. The meat obtained from rabbits supplemented with TLP (T3) and prebiotic (T1) had significantly (P < 0.05) higher appearance scores than meat obtained from control and antibiotic formulations. Minor variations were found between the appearance scores of meats obtained from rabbits fed with control diet (C) and antibiotic (T2) but these differences are not statistically significant. The meat samples obtained from rabbits fed with control diet had significantly (P<0.05) lower flavour scores than meat obtained from rabbits fed with other dietary supplements. The meat obtained from rabbits fed with TLP (T3) had significantly (P < 0.05) higher tenderness, juiciness and overall acceptability scores than meat obtained from rabbits fed with control diet and other dietary formulations.

The higher appearance scores might be due to increased intensity of colour of rabbit meat which influence the sensory panel members to score higher appearance values for rabbit meat samples obtained from rabbits supplemented with herbal formulations. The higher flavour scores may be due to decrease in the lipid oxidation by the anti-oxidant compounds of TLP and also more organic nature of rabbit meat felt by sensory panel members. Meat obtained from rabbits fed with TLP had retain more water during cooking thus increased the juiciness of the cooked product. The higher overall palatability scores in rabbit meat obtained from rabbits fed with dietary formulations might due to higher flavour, juiciness and tenderness scores of rabbit meat obtained from rabbits fed with herbal formulations and control diet thus causes higher overall palatability scores of respective rabbit meat samples. These results are in agreement with Bhaskar Reddy et al. (2021) in different varieties of chicken. Further, the results obtained in this study are similar to Kirkpinar et al. (2014) observed that dietary supplementation of oregano (*Origanum vulgare* L.) essential oil had significantly higher juiciness, flavour, oxidized flavour and acceptability in broiler meat.

CONCLUSION

Based on the results, it can be concluded that addition of tulasi leaf powder in rabbit feed recorded higher pre slaughter weight, hot carcass weight, dressing per centage, meat bone ratio, muscle and fat per cent than remaining formulations fed rabbits. Further, meat

obtained from rabbits fed with tulasi leaf powder lowered drip loss and had higher ERV, WHC, cooking yield and superior sensory scores than meat from rabbits fed with other formulations. Hence, it can be suggested that addition of tulasi leaf powder @ 50 g/kg feed of broiler rabbits had better economic returns in the commercial broiler rabbit farms.

COMPETING INTERESTS

The authors do not have any competing interests among themselves or others related to this research work.

ETHICAL STATEMENT

All the experimental procedures were reviewed and approved by Institutional Animal Ethics Committee (IAEC) (281/go/ReBi/S/2000/CPCSEA/CVSc/TYTY/015/Physiology/2021/dated 24.08.2021) of the College of Veterinary Science, Sri Venkateswara Veterinary University, Tirupati.

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