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The Effect of Litter Type and Litter Thickness on Broiler Carcass Traits

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Abstract: In this research, straw and pine shavings were used as litter. Litter thicknesses were 5, 8 and 11cm respectively. 18 chicks were placed per m² and total 120 chicks were used in 3 groups. The study was performed two replicates. According to results of the investigation, the best live weight (1.67±0.11 kg) and carcass weight (1135.06±84.47g), heart weight (10.48±1.68g), liver (38.39±5.51g) and gizzard weight (37.10±4.40 g), and carcass yield (67.90±3.2%) were obtained from 5cm-pine shaving group. These results were significantly higher than the results of 11cm-straw and 11cm mixed form. Desired lowest abdominal fat level (17.28±2.6 kg) and feed efficiency rate (2.25) were also obtained from pine shavings of 5 cm thickness.

Key words: Broiler, litter type, litter thickness, growth performance

Introduction

The broiler production is commonly performed on the floor. In Turkey, housing on the floor looks like will last for a long years. From this point of view, the litter usage is a necessity in the broiler rearing (Koçak, 1978). It is an expensive process. Furthermore, it is a necessity to find litter at a reasonable cost for all regions.

A lot of studies can be found in the literature about cheap and quality litter (Brake *et al.*, 1992, Demirulus *et al.*, 1998, Mutaf *et al.*, 1980, Sengül *et al.*, 1996, Wyatt and Goodman, 1992).

The preferred can be varying. Commonly straw and pine shavings and a mixture of them (Cartney, 1971; Richard and Jordan, 1974; Rusaller, 1974). Poyraz *et al.* (1990) used pine shavings, rice husk and paper clippings as litter and they obtained the best results from rice husk. Malone *et al.* (1990) used kenaf and pine shavings and did not obtained a significant difference between groups. On the other hand, Koçak *et al.* (1991) used pine shavings, diatomite and mixture of them and they had obtained the most ideal results from pine shavings. Demirulus *et al.* (1998) used straw, pine shavings and mixture of them, and they obtained the best results from straw. Sengül *et al.* (1996) used pine shavings, sawdust and dried grass and they did not found a significant difference among the groups when live weights are considered.

Litter thickness can vary. Koçak (1978); Akbay and Senocak (1987), have been recommending that the litter thickness should be 5cm, 5-6cm and 7cm respectively. Erensayin (1991) reported that litter thickness is generally mean 1 cm all over the country on summer. Whereas, Demirulus (1998) found litter thickness as mean 4.9 cm in the East Anatolia Region.

Mutaf *et al.* (1980), used pine shaving, rice husk and mixture of sawdust + pine shaving and obtained the best live weight result from 10 cm thickness of sawdust and

pine shaving mixture. Sengül *et al.* (1996) used pine shaving, sawdust and dried grass at 10 cm thickness and did not found a significant difference in live weight, feed efficiency, feed consumption and livability ($P>0.05$), at the end of the trail except the carcass performance. On the other hand, Demirulus *et al.* (1998), used pine shavings, sawdust and mixture of them at 5 cm thickness. They did not found a significant difference among the litter groups when tights, wing, bag, heart, liver, gizzard and the live weight were considered at the end of the trail. But they found a significant difference among them plucked carcass, breast, abdominal fat and neck weights were considered. The best litter group was straw ($P<0.05$).

As far as seen in the literature there is no concert conclusion for litter type and thickness for various regions and climates. There is a necessity to investigate the optimum litter type and thickness to obtain higher yield of desired performance.

The aim of this study is to determine the best litter type, thickness and the cost in the Eastern Anatolia.

Materials and Methods

Ninety Ross PM3 chicks were used in this study. This research was conducted in poultry house of Yuzuncu Yil University, Agriculture Faculty. Feed, used in the trail, was prepared in our farm. The starter feed had 24% protein, 3200 kcal/kg M.E. and the finisher feed had 20% protein, 3200 kcal/kg M.E. As litter material, straw, pine shaving and their mixed form at 50% ratio were utilized. 5 cm, 8 cm or 11 cm litters were used as thickness. There were two replication for each type of litter and litter thickness.

Chicks were placed randomly, as mixed sex, in divisions as 18 chicks/m², and weighted at first day. 24 h L + 1 dark illuminating program was applied the trail. The same feed was thought fed to all groups, and new castle

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Table 1: The effects of litter type and litter thickness on live weight, carcass yield and feed conversion ratio of broilers

Litter type	Litter Thickness (cm)	n	Live weight (kg)	Carcass Yield (%)	FCR
Straw	5	10	1.66±0.07 ^a	67.59±0.07 ^a	2.50
	8	10	1.35±0.06 ^b	68.10±4.71 ^a	2.36
	11	10	1.24±0.03 ^b	63.55±1.98 ^b	2.66
Pine	5	10	1.68±0.04 ^a	68.21±5.49 ^a	2.01
	8	10	1.51±0.01 ^a	66.63±0.01 ^{ab}	2.09
Shavings	11	10	1.27±0.03 ^b	67.49±3.99 ^{ab}	2.17
	5	10	1.67±0.11 ^a	67.90±3.20 ^{ab}	2.25
Mixed form	8	10	1.43±0.09 ^{ab}	67.36±2.85 ^{ab}	2.37
	11	10	1.25±0.18 ^b	65.52±7.12 ^b	2.41

^{a,b}: Means within a column with no common superscripts differ significantly. FCR: Feed Conversion Ratio

Table 2: The effects of litter type on carcass, giblets, and abdominal fat weights of broilers (g)

Litter Type	Thickness (cm)	n	Carcass	Heart	Liver	Gizzard	Abdominal Fat
Straw	5	10	1122.0±128.6 ^a	9.1±0.9 ^{ab}	36.6±6.4 ^a	36.4±7.4 ^a	19.6±11.5 ^a
	8	10	921.8±25.7 ^{ab}	9.2±0.1 ^{ab}	33.3±4.0 ^{ab}	32.1±2.4 ^{ab}	8.0±1.2 ^b
	11	10	792.0±155.6 ^b	8.9±0.3 ^b	25.9±3.5 ^b	27.4±4.7 ^b	7.4±1.1 ^b
PineShaving	5	10	1148.1±64.5 ^a	11.8±0.4 ^a	40.1±6.2 ^a	37.8±1.2 ^a	14.9±3.1 ^{ab}
	8	10	1011.0±14.1 ^a	10.4±2.8 ^a	32.7±3.3 ^{ab}	30.±0.4 ^{ab}	12.1±0.1 ^{ab}
	11	10	854.2±163.8 ^{ab}	10.6±0.1 ^{ab}	30.2±2.8 ^{ab}	28.6±4.9 ^b	6.5±0.7 ^b
Mixed form	5	10	1135.1±84.5 ^a	9.5±1.7 ^a	38.4±5.5 ^a	37.1±4.4 ^a	17.3±7.4 ^a
	8	10	966.4±53.6 ^{ab}	9.8±1.7 ^{ab}	33.0±3.1 ^{ab}	31.2±1.8 ^{ab}	10.1±2.6 ^{ab}
	11	10	823.0±135.27 ^b	9.3±3.4 ^{ab}	28.5±3.5 ^b	29.1±3.4 ^b	6.9±0.9

^{ab}: Means within a column with no common superscripts differ significantly.

and gumboro vacs were applied.

Day old broiler chicks were wing banded for identification and weighted to determine live weight by a balance sensitive to 1g every week until slaughter. The trail lasted 6 weeks and 5 birds from per group (with two repetition total 10 birds/group), total 60 birds were slaughtered at the end of the experiment. Live weights, carcass yields, giblets weights and feed efficiency were calculated. Giblet weight was not included in the calculation of carcass yield.

The data were evaluated as factorial at random parcel. F test was applied by ANOVA. In addition differences among the combinations were determined by LSD test. These analyses were performed by SAS (1995).

Results and Discussion

The results of live weights carcass yield and feed efficiency ratio (FCR) were presented in Table 1. It was found that the interactions among litter type were not significant ($P>0.05$) and the interactions among the litter thickness were significant ($P<0.05$).

The best live weight (1.68±0.04kg) was obtained from 5 cm-pine shavings group.

Poyraz *et al.* (1991) found the similar results. But, Sengül *et al.* (1996) used pine shaving, straw and dry grass in their experiment and obtained the best live weight results from dry grass-group. On the other hand, Demirulus *et al.* (1998) used straw, pine shaving or mixture of these as litter and found the best live weight results from straw group. There are big differences among the findings. The reason could be difference of the time and season of the accomplished study.

Carcass yields results were presented in Table 1. Giblet weight was not included in calculation of carcass yield. The best carcass yield (68.21±5.49 %) was obtained from 5 cm-pine shavings group. Mutaf *et al.* (1980) housed the broilers on the grill, pine shaving, mixture of pine shaving + straw and mixture of pine shaving + rice husk and obtained the best carcass yield (72.01±0.71 %) from 20 cm-pine shaving + straw. Sengül *et al.* (1996) obtained similar yield (68.05±0.52%) as observed in this study.

The best-feed efficiency (2.25) was obtained from 5cm-group. Different results were reported by some researchers (Lien *et al.*, 1992, Sengül *et al.*, 1996). Carcass and giblets weights were presented in Table 2. The highest carcass, heard, liver and gizzard weights were 1148.1±64.5, 11.8±0.4, 40.1±6.2, 37.8±1.2 respectively. The lowest abdominal fat weight (6.5±0.7g) was obtained from 11 cm-pine shaving group.

Generally, the best results were obtained from 5 cm-group. Because, 5 cm litter supplied a suitable conditions for chicks. Mutaf *et al.* (1980) obtained the best results from 15 cm pine shavings + straw group. Sengül *et al.* (1996) obtained the same results from 10 cm-dry grass group.

The cost of litters were determined as Euro and presented in Table 3.

According to Table 3, the lowest cost was obtained from 5 cm group (0.16 Euro/m²). Thicker litter, more than 5 cm, is not necessary for determined performances. and it also increases the cost of littering the other litters. Additionally, the cheapest cost of litter was obtained 5 cm group.

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Table 3: The cost of litters (Euro/kg)

Thickness (cm)	Type of Litter		
	Pine Shavings	Straw	Mixed form
5	0.16	0.23	0.41
8	1.13	0.59	0.86
11	1.61	0.89	1.25

Even though no significant difference exist between the tested groups, considering all finding, especially the best live weight, carcass yield, gizzard weight, heart weight of 5cm-pine shaving litter were higher than the other two groups. In addition to that higher feed efficiency and lower abdominal fat level were also obtained from the group of 5 cm pine shaving.

Conclusion: Pine shaving was found to be beneficial in terms of providing softness and easiness to walk, tolerating wetness and excrements for rearing broiler chick and lowering the expenses for littering.

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