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# Effect of Feeder Modification and Feed Form on Feed Loss and Conversion Efficiency in Small-Scale Broiler Farms

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## ABSTRACT

Feed losses in broiler farms are negatively affecting the health and growth of broiler and thus reducing profitability. This study aimed to estimate feed loss in small-scale broiler farms using two modified conventional feeders, Trough and Tube feeders, and two different feed forms, Mash and Pellet. The experiment was carried out using non-modified feeders and modified by attaching a 4×4 cm protective net to Trough feeder and reducing length from 6 cm to 4 cm to Tube feeder. Results showed a very slight effect of feeder type on feed loss for the benefit of the Trough feeder. The feed losses were significantly noted (from 3.91% to 1.84% before and after modification, respectively) when feeding Mashed feed with Trough feeder. Similarly, it was significantly reduced from 8.17% to 2.10% before and after modification, respectively, when fed Pelleted feed with Trough feeder. However, the feed loss decreased as the older the broiler chicken gets (losses reduced from 9.93% in the 4th week to 2.39% in the 7th week). Feed loss was significantly increased when feeding pellet feed (loss=10.76%) as compared to mashed feed (feed loss=2.60%). The feed conversion ratios (FCR) were 1.93 and 1.88 when Trough and Tube feeder types were used, respectively. The feed losses were reduced from 7.32% to 0.75% and 6.04% to 1.97% for modified Tube and Trough feeders, respectively. In conclusion, feed loss was decreased as the broiler age increased, and the loss rate was higher using Pellet feed compared to Mash feed. Summing up, modified feeder by itself had no significant effect on feed loss, even though feed loss was substantially reduced, and FCR was improved.

**Keywords:** broiler's age, feed waste, pellet, mash, feeder types

## INTRODUCTION

Feed losses in poultry farms are defined as the quantity of feed lost and inefficiently utilized by broilers during the feeding process. Feed losses could be attributed to improper feed storage and spoilage, inadequate feed formulation, and inefficient feeding practices (**1**). The latter is a major challenge facing poultry production (**2, 3**). Feed losses in broiler farms lead to economic losses for small farmers and thus negatively affect the health and growth of broiler chickens (**4-6**). Therefore, avoiding feed losses in broiler farms are crucial for enhancing profitability and reducing feed production costs and enhancing performance (**7-9**).

In general, approximately 70% of poultry production cost is attributed to the cost of feed and feeding (**10**). The feed that is usually offered in mash form has been associated with higher feed waste when offered to poultry compared to pellet or crumbling feed (**11-13**). Minimizing feed waste losses by feed agglomeration processes (such as pelleting) can reduce feed losses by 18% compared to diets offered in a mash form (**14, 15**). Particle size may influence feed palatability because poultry prefers selecting big particles (**16**). Low feed palatability can influence feeding behavior in broilers by increasing time searching for palatable ingredients and this may increase feed waste (**17, 18**). Offering poultry non-ideal particle size may increase the duration of poultry meals and can influence broiler performance by forcing birds not to uptake nutritional requirements for maintaining optimal growth (**19**).

Small-scale farmers use non-automatic feeders in Jordan for poultry feeding (**20**). Two feeder types are commonly used: Linear (Trough) and Circular (Tube) feeder. The Feeder types, feeder dimensions and feeder distribution are among the crucial factors that affect the profitability and efficiency of poultry feeding (**21, 22**). Despite the economic significance of broiler production in Jordan, there is a notable absence of published studies evaluating the impact of feeder type-specifically trough versus tube feeders, on feed loss and efficiency under local environmental and management conditions. While international research, such as that conducted by Neves et al. (**23**) in Brazil, has demonstrated behavioral and performance differences among feeder types, these findings may not be directly transferable to Jordan's semi-arid climate, housing systems, and production scale. This gap in the literature presents a compelling rationale for localized investigation. Given that feed cost constitutes the largest proportion of broiler production expenses, optimizing feeder design to minimize wastage is critical. Therefore, the absence of region-specific data not only justifies but also necessitates this study to inform evidence-based management practices tailored to Jordanian poultry systems.

## Materials and Methods

The feeder types and feed forms available in the Jordanian market were used in this experiment to determine the effect of possible factors on broilers feed losses. Two feeder types were included in the experiment; linear feeder (Trough) and galvanized steel circular (Tube) feeder. They are locally manufactured based on universal design by Miller Manufacturing Company, USA. In addition, two feed forms were used, Pellet and Mash forms. It is good to note that both types are commonly used by small-scaled broiler farmers in Jordan. The feed diet was manufactured according to bird breed guidelines by a private feed miller specialized for providing it to small- scale broiler farms which rear broiler breed of Ross 308®. The starter feed was offered during the period from 1 to 15 days of production lifetime, whereas grower feed was offered on day 16 onward. It contained crude protein and total energy of 21.5% and 3990 kcal/kg, respectively. The grower feed contained crude protein and total energy of 19% and 4085 kcal/kg, respectively. Both feed types were formulated from corn, soybean meal, vegetable oil, calcium carbonate, mono- or dicalcium phosphate, salt, dl-methionine, sodium bicarbonate, vitamins and minerals, antifungal, mycotoxins (aluminosilicates), choline chloride, threonine, and anticoccidial supplement.

The study was divided into two experiments. In the first experiment, feed losses were estimated using the two feed forms without making any modifications to feeder types to mimic similar situation in ordinary farms. However, the second experiment was performed with modifications in feeder types design to minimize the feeding losses (**Figure 1**). The poultry house designated for the experiment was divided into 16 pens/sections (i. e. rooms or experimental units) with an area of 6 $m^2$ for each pen. Each pen was allocated with 60 one-day old male chicks of Ross 308 Slow Feathering breed totaling 960 chicks in the house for each experiment. The poultry house was cleaned and sterilized before starting the experiment following general guidelines starting with preparation phase after the end of the previous production cycle. The preparation phase was removing all litter and taking out all removable equipment (feeders, drinkers, etc.) for separate cleaning. The next phase was wet cleaning in which all surfaces (walls, ceiling, floor) were soaked with clean warm water for 60 min to loosen dirt and organic matter. Third stage was detergent washing using alkaline detergent (Sodium hydroxide-caustic soda) to break down fat and protein residues. Fourth stage was disinfection using broad-spectrum disinfectants commercially available such formalin products. Then the house was dried and sprinkled with quicklime (locally manufactured by Jordan Carbonate Company (JCC), https://jordancarbonate.com/ to absorb any excess moisture exist in the poultry house and to eliminate any possible harmful organisms. Fumigation then was applied using formaldehyde gas and potassium permanganate for strict safety measures. The poultry house was left to rest period empty for 14 days to break the disease cycle before the current experiment cycle starts. In both experiments, birds were distrusted when chicks reach an age of 14 days. In case mortality was found the dead chick was replaced by other reserved chicks from another pen made for this purpose. The study was ethically approved by ethical committee at Mutah University (Research Team No. FS-AgrL4L2021).

On the other hand, guideline for broiler production in Jordan with respect to temperature, humidity, lighting intensity, and lighting period was considered as recommend in controlled production environments. The details were lighting program of 50 watts lamp/pen 8000 k, 5000 LM for 24 h, temperature program of age related starting from 34°C on first day to 19°C on day 35 till end of production Cycle. Relative humidity ranged from 50 to 70% during whole production cycle.

### The Experiment without Feeders' Modification

Broiler chicks of 14-day old were fed with two feed forms using traditional feeders: Tube feeders and Trough feeders. The growing-mixture diets introduced to the 14-days old broilers in two forms: Pelletized feed and Mashed feed (soft feed) diets. At the end, the experiment was set up with four treatments with four replications (i. e. rooms) as follows: (i) T1: a Tube feeder with Mashed feed diet, (ii) T2: a Tube feeder with Pelleted diet, (iii) T3: a Trough feeder with Mashed diet, and (iv) T4: Trough feeder with Pelleted diet.

To estimate the amount of feed losses from the feeders, trays with 10 mm mesh screens were placed under the feeders with dimensions of 70×70 cm and dimensions of 70×150 cm for Tube and Trough feeders, respectively to capture and collect the lost feed (**Figure 1**). The following measurements were weekly recorded when the broilers reached the fourth week (28 days), the fifth week (35 days), the sixth week (42 days), and the seventh week (49 days): weight of feed provided, feed lost, and average broilers body weight was recorded. The percentage of feed loss per pen for each treatment was calculated estimated using the following formula:

$$\text{Feed loss (\%)} = \frac{\text{Feed provided} - \text{feed lost}}{\text{Feed provided}} \times 100\%.$$

The feed conversion ratio (FCR) was estimated using the following formula:

$$\text{FCR} = \frac{\text{Body weight (kg)}}{\text{feed provided ((kg)}} \text{ (24, 25).}$$

## The Experiment with Feeders' Modification

In the second experiment, the feeders were modified for a broiler flock in an attempt to reduce feed loss. The same procedures were used as in the experiment before the feeders' modification experiment. Tube feeders were modified by adding a protective net with 4 cm dimensions (4×4 cm) and by reducing the feed distance from 6 cm to 4 cm for the Trough feeders (**Figure 1**). The same measurements were recorded after feeders' modification with a hoping that there will be a reduction in feed loss after the modification.

## Statistical Analysis

A 2×2 factorial experiment was conducted to evaluate the interaction between feeder type (Trough and Tube) and feed form (Mash vs. Pellet) on feed loss. The statistical analyses were conducted using SAS software (9.1) (**26**). The collected data were subjected to analysis for variance to tests the statistical differences between treatments at α level of less than 0.05. The comparisons between treatments were performed using the least significant difference (LSD) at $P \leq 0.05$.

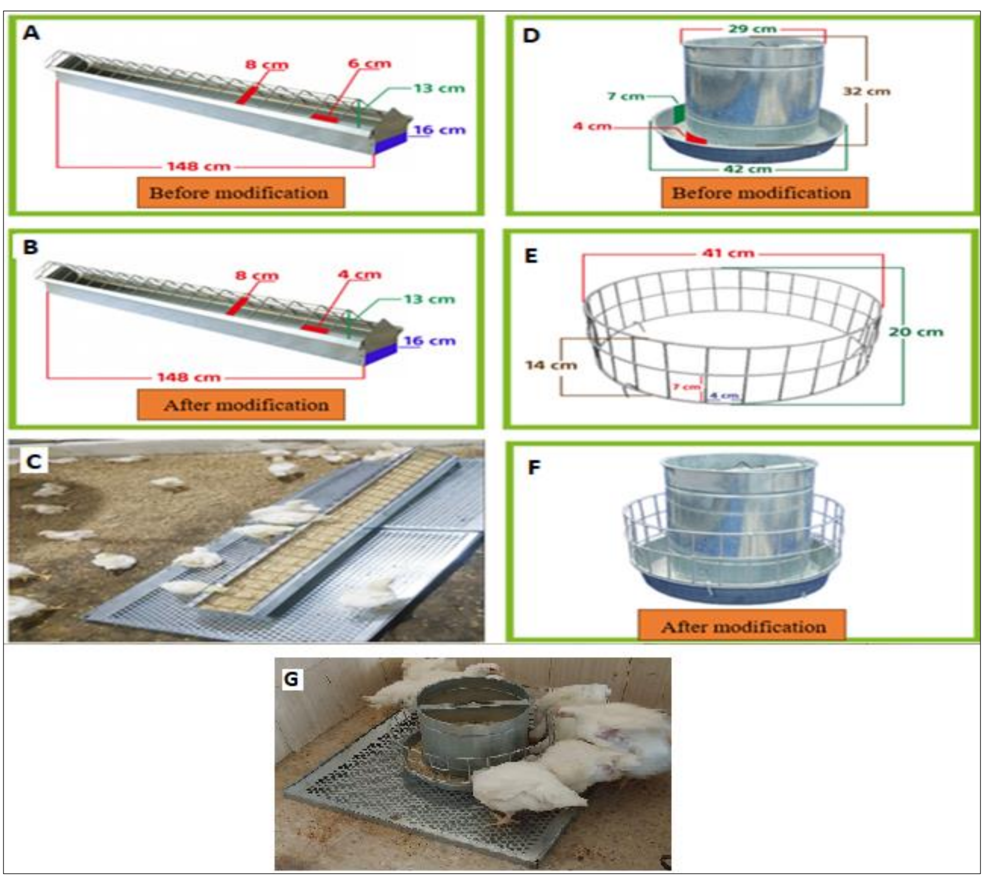


**Figure 1.** Dimension and external shape of the feeders before and after modification. **(A)** Trough feeder before modification (conventional). **(B)** Trough feeder modified by reducing feed distance from 6 to 4 cm. **(C)** Trough feeder modified by reducing feed distance from 6 to 4 cm with the mesh screen underneath. **(D)** Galvanized steel Tube without modification (conventional). **(E)** Added up surrounding net by 4×4 squares. **(F)** Galvanized steel Tube feeder modified with the surrounding the net. **(G)** Modified Tube feeder with the mesh screen underneath

## RESULTS

### Effect of Non-Modified Feeder Type on Feed Losses

The effects of broiler age, feed types and feeder types on feed loss and FCR as well as their interaction effects are presented in **Table 1.** The results show feed consumption significantly and consistently increased ($P \leq 0.05$) with age (from 40.8 kg in the 4th weeks to 80.8 kg in the 7th week). Results also revealed no significant differences between the two feeders' types (Trough: 6.04 and Tube: 7.32%, respectively). However, the differences were clearly related to the broilers age and feed type rather than feeder types. Feed loss was inversely related to their age, the older the broiler age, the less loss there is, where the loss decreased significantly ($P \leq 0.05$) from 9.93 to 2.39% as the broiler's age increased from 4 to 7 weeks. The feed forms provided to the broilers also significantly ($P \leq 0.05$) affected the loss rate. Nevertheless, feed losses were significantly higher ($P \leq 0.05$) when broiler fed on pellet feed (loss=10.76%) in comparison with those fed on mashed feed (feed loss=2.60%). The FCR was not affected either by the type of feed nor by the feed form. The FCRs were 1.87 and 1.94 fed on mash and pellet feed, respectively. Whereas the FCRs were 1.93 and 1.88 when Trough and Tube feeder types were used, respectively. However, there was a clear decrease ($P \leq 0.05$) in the FCR with the broiler age, and the reduction was significantly different ($P \leq 0.05$) in the 7th week (value=1.53) compared to the fourth, fifth and sixth weeks (values=1.99, 2.17 and 1.94, respectively).

The interaction effects of broiler age, feed type, and feeder type on feed loss were highly significant ($P \leq 0.05$) (**Tables 1 and 2**). The maximum feed loss was recorded when Tube feeder and pellet feed were used at the 4th week of broiler age (20.47%), and then losses decreased ($P \leq 0.05$) to 2.32% at the 7th week of broiler age. As for the Trough feeder, over the same rearing periods with pelletized feed type, the feed loss was 12.07% in the 4th week of broiler age, and then the loss decreased ($P \leq 0.05$) to 3.16% in the 7th week. With a similar trend, the feed loss decreased ($P \leq 0.05$) from 20.47 to 13.68% in the 4th and 7th week of broilers age. For comparison, the feed loss was less (1.08%) using the Tube feeders as compared to Trough feeders (6.12%) at 4th week of broiler age using mashed feed type. The feed loss decreased ($P \leq 0.05$) to 1.52% and up to 2.55% using Tube feeder and Trough feeder at 7th weeks of broiler age. It seems to be that the Tube feeder was preferable when using mashed feed type.

**Table 1.** Effects of broiler age, feed types, feeder types and their interactions on the feed loss and feed loss (%), body weight and feed conversion ratio before modification of feeders (Experiment 1)

| Age (week) | Consumed feed (kg) | Feed loss (kg) | Feed loss (%) | Body weight (kg) | Feed conversion ratio |
|---|---|---|---|---|---|
| 4 | 40.8 d | 4.75 ab | 9.93 a | 0.92 d | 1.99 ab |
| 5 | 51.0 c | 4.25 b | 7.57 b | 1.30 c | 2.17 a |
| 6 | 72.9 b | 5.50 a | 6.83 b | 1.85 b | 1.94 ab |
| 7 | 80.8 a | 1.98 c | 2.39 c | 2.62 a | 1.53 b |
| LSD ($P \leq 0.05$) | 1.90 | 1.12 | 1.90 | 0.71 | 0.47 |
| PSEM | 0.65 | 0.39 | 0.67 | 0.03 | 0.16 |
| **Feed type** | | | | | |
| Mash | 63.1 a | 1.62 b | 2.60 b | 1.73 a | 1.87 a |
| Pellet | 59.7 b | 6.61 a | 10.76 a | 1.61 b | 1.94 a |
| LSD ($P \leq 0.05$) | 1.30 | 0.79 | 1.30 | 0.50 | - |
| PSEM | 0.46 | 0.28 | 0.47 | 0.02 | 0.12 |
| **Feeder type** | | | | | |
| Trough | 61.4 a | 3.58 b | 6.04 a | 1.68 a | 1.93 a |
| Tube | 61.4 a | 4.66 a | 7.32 a | 1.67 a | 1.88 a |
| LSD ($P \leq 0.05$) | - | 0.79 | - | - | - |
| PSEM | 0.42 | 0.28 | 0.18 | 0.02 | 0.12 |
| **Interaction effect** | | | | | |
| Age × Feed type | ** | ** | ** | Ns | Ns |
| Age × Feeder type | Ns | Ns | Ns | Ns | Ns |
| Feed type× Feeder type | ** | ** | ** | Ns | Ns |
| Age × Feed type× Feeder type | Ns | ** | ** | Ns | Ns |

Values in lines and rows followed by the same letter(s) are not significantly differ at P ≤ 0.05. Ns: Not significantly differ. PSEM: pooled standard error of mean

**Table 2.** Interaction effect of broiler age, feed type and feeder type on feed loss (kg) and feed loss (%) before feeders' modification

| | | Feed loss (kg) | | Feed loss (%) | |
|---|---|---|---|---|---|
| Age (week) | Feed type | Tube feeder | Trough feeder | Tube feeder | Trough feeder |
| 4 | Mashed | 0.46 e | 2.84 de | 1.08 g | 6.12 efg |
| 5 | Mashed | 0.66 e | 2.14 de | 1.21 g | 3.76 fg |
| 6 | Mashed | 1.00 de | 2.51 de | 1.34 g | 3.20 g |
| 7 | Mashed | 1.23 de | 2.13 de | 1.52 fg | 2.55 g |
| 4 | Pelleted | 10.6 ab | 5.07 cd | 20.5 a | 12.1 bcd |
| 5 | Pelleted | 9.87 ab | 4.33 cde | 16.9 ab | 8.37 def |
| 6 | Pelleted | 11.5 a | 7.00 bc | 13.7 bc | 9.09 cde |
| 7 | Pelleted | 1.94 de | 2.65 de | 2.32 g | 3.16 g |
| PSEM | | 0.79 | 0.79 | 0.86 | 0.86 |

Values in lines and rows followed by the same letter(s) are not significantly differ at $P \leq 0.05$. PSEM: pooled standard error of mean

## Effect of Modified Feeder Type on Feed Losses

The effects of broiler age, feed types and modified feeder types on feed loss and FCR as well as their interaction effects are presented in **Table 3**. The feed losses were significantly affected ($P \leq 0.05$) by the studied factors. It is noted that feed losses were affected by the broilers' age by reducing the percentage from 1.13% on 5th week to 1.52% on 6th week. The FCR significantly increased from 1.52 to 2.40 in the 4th and 7th week of the broilers' age. Feed type had no significant effect on feed loss (losses=1.32 and 1.41 using mash and pellet feed forms, respectively). On the other hand, results revealed more significant losses ($P \leq 0.05$) using Trough feeders (1.97%) compared with Tube feeders (0.75%), with no significant differences in feed conversion ratio (values=2.04 and 1.92, respectively) (**Table 3**).

## Comparison Between Feeder Types with and without Modification

In general, the previous results showed that feed losses (amount and percentage) were significantly reduced by feeder's modification compared to non-modified feeders (**Table 3**). Furthermore, Table 4 shows that feed losses and body weight were also affected by the interaction of feed types and Trough feeder after modification. On the other hand, **Table 4** shows non-significant interaction effect of feed type and trough feeder only on FCR.

**Table 3.** Effect of broiler age, feed types and feeder types and their interaction effects on the feed loss and feed conversion ratio after feeders' modification (Experiment 2)

| Factor | Consumed feed (kg) | Feed loss (kg) | Feed loss (%) | Body weight (Kg) | Feed conversion ratio |
|---|---|---|---|---|---|
| **Age** | | | | | |
| 4 | 44.61 b | 0.63 a | 1.39 ab | 1.24 d | 1.52 c |
| 5 | 42.51 c | 0.48 b | 1.13 b | 1.62 c | 1.86 b |
| 6 | 48.80 a | 0.75 a | 1.52 a | 2.10 b | 2.13 ab |
| 7 | 41.13 c | 0.60 ab | 1.41 ab | 2.49 a | 2.40 a |
| LSD ($P \leq 0.05$) | 1.75 | 0.15 | 0.33 | 0.06 | 0.33 |
| PSEM | 0.69 | 0.22 | 0.43 | 0.02 | 0.16 |
| **Feed type** | | | | | |
| Mash | 44.72 a | 0.60 a | 1.32 a | 1.84 b | 2.04 a |
| Pellet | 43.80 a | 0.63 a | 1.41 a | 1.88 a | 1.92 a |
| LSD ($P \leq 0.05$) | Ns | Ns | Ns | Ns | Ns |
| PSEM | 0.48 | 0.15 | 0.30 | 0.02 | 0.12 |
| **Feeder type** | | | | | |
| Trough | 44.61 a | 0.90 a | 1.97 a | 1.86 a | 1.84 a |
| Tube | 43.92 a | 0.33 b | 0.75 b | 1.86 a | 1.92 a |
| LSD ($P \leq 0.05$) | Ns | 0.10 | 0.23 | Ns | Ns |
| PSEM | 0.50 | 0.16 | 0.31 | 0.02 | 0.12 |
| **Interaction effect** | | | | | **Ns** |
| Age × Feed type | Ns | Ns | Ns | Ns | Ns |
| Age × Feeder type | ** | Ns | Ns | Ns | ** |
| Feed type× Feeder type | Ns | Ns | Ns | Ns | Ns |
| Age × Feed type× Feeder type | Ns | Ns | Ns | Ns | Ns |

Values in lines and rows followed by the same letter(s) are not significantly differ at $P \leq 0.05$. PSEM: pooled standard error of mean, Ns: Not significantly differ

**Table 4**. Interaction effect of feed type and Trough feeder type (before and after modification) on feed loss (kg), feed loss (%), body weight (kg) and feed conversion ratio by comparing Trough feeder types before and after modification

| Feed type | Feeder type | Feed loss (kg) | Feed loss (%) | Body weight (kg) | Feed conversion rate |
|---|---|---|---|---|---|
| Mashed | Trough Conventional | 2.41 b | 3.91 b | 1.75 b | 1.81 a |
| Mashed | Trough Modified | 0.85 c | 1.84 c | 1.83 a | 2.13 a |
| Pelleted | Trough Conventional | 4.75 a | 8.17 a | 1.60 c | 2.05 a |
| Pelleted | Trough Modified | 0.95 c | 2.10 c | 1.88 a | 1.95 a |
| PSEM | | 0.04 | 0.08 | 0.05 | 0.32 |

Values in lines and rows followed by the same letter(s) are not significantly differ at $P \leq 0.05$. PSEM: pooled standard error of mean

# DISCUSSION

The effects of bird age, feed type, and feeder design on feed losses and feed conversion were investigated in this study. The results obtained from this study focused on a new concept by modifying feeders in a way to control the feed losses by controlling the feeding area per bird. When the effect of bird age on feed loss was studied before feeders' modification, it was found that the feed loss decreased with increasing broilers' age from 9.93 to 2.39%, and the FCR decreased from 1.99 in 4th week to 1.53 in the 7th week. This reduction in feed loss and improvement of body conversion rate by increasing broilers' age could be attributed to improved access of broilers to the feeder and might be also due to the better feeding behavior as the broiler became older (**27**), indicating an efficient feed utilization as the birds get old. Because feed loss is usually included in calculating the FCR, the higher the feed loss led to a higher FCR value. However, in the second rearing cycle, results showed that the age had no effect on feed loss after feeders' modification (the losses were 1.39 and 1.41% in the 4th and 7th week) and consequently FCRs were significantly increased from 1.52 to 2.40 at 4th week and 7th week of birds rearing, respectively. In accordance, Myers et al. (**28**) showed that controlling the feed spacing in the feeders had an obvious effect on reducing feed loss rate. This study showed that calculating the FCR depends on the quantity of feed provided rather than the feed consumed. Huang et al. (**22**) found that adjusting the height of the feeders and feeding distance significantly reduced feed loss and improved feed conversion efficiency.

Although pelleted diets have the advantage of broilers' weight and growth due to improving diet intensity and palatability (**1**). It is notable that the pellet feed led to more feed loss. In contrast, previous reports stated that mash feed has been associated with higher feed loss to pellet or crumble feed (**11-13**). This might be attributed to the crumbling and scattering of the pelletized feed or a result of aggressive pecking behavior that causes further scattering and loss of feed. This study showed that pelletized feed led to higher feed losses as compared with mashed feed (losses=10.76% and 2.6%, respectively) in the first rearing cycle. In the first rearing cycle, there was a significant effect of the birds' age on feed losses when mashed feed was used, but there was a clear significant effect of the birds' age on feed loss when pelleted feed form was used and it was inversely related. In other words, the older the birds get the lower the feed loss rate becomes. Since young birds are accustomed to consuming mashed feed, birds will search for fine pellets and scatter the pelleted feed which might lead to higher feed losses. When the feed spacing was adjusted, the size of the feed pellets provided to the birds did not affect the feed loss rate (losses=1.32% and 1.41% for mashed and pelleted feed, respectively). There was no effect on the FCR after adjusting the feed spacing. The study did not also show any significant effect of feed type on the FCR. Similarly, results obtained by Chewning et al. (**29**) showed that there was no significant effect of particle size on FCR. Based on the results study, it seems that feeder design has an effect and thus its importance was considered by feeder manufacturing and designer. Similarly, several researchers emphasized the importance of the feeder design and the density of birds inside the poultry house to have easy access to them. (**17, 30, 31**).

This study showed a very slight effect of feeder type on feed loss for the benefit of the Trough feeder, which showed less feed loss although non-significant as compared with the Tube feeder. These results indicate that feed loss might be affected by feeder design, and some modifications might be necessary to the feeders' design to enhance the birds' access to the diet. Furthermore, the loss rate was higher when broilers fed on pellet feed compared to mash feed. Summing up, feeder type and form had no significant effect on feed loss, even though feed loss was substantially reduced, and the body conversion ratio was improved using feeders' modification.

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## Conflict of interest

The authors declare no conflict of interest.

## Artificial Intelligent Declaration

The authors declare that they are responsible for the accuracy and integrity of all content of the manuscript, including part generated by AI, and it is not used as a co-author.

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# تأثير تعديل المعلف وشكل العلف على فاقد العلف وكفاءة التحويل الغذائي في مزارع دجاج اللحم ذات الحيازات الصغيرة


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**الخلاصة**

إن فقدان العلف في مزارع دجاج اللحم يؤثر سلبًا على صحة ونمو الدجاج، مما يزيد من تكاليف الإنتاج ويقلل من الربحية. وقد هدفت هذه الدراسة إلى تقدير فقدان العلف في مزارع دجاج اللحم ذات الحيازات الصغيرة باستخدام نوعين من المعلف التقليدي والمُعدّل وهما المعلف الأنبوبي والمعلف الحوضي - ونوعين مختلفين من العلف - العلف المُهروس والعلف المُحبب. وأُجريت التجربة على مستويين، الأول بدون أي تعديل على نوع المعلف، والثاني تضمن معالف تقليدية معدلة لتقليل فاقد العلف وخلال فترة الإنتاج من عمر ٤ إلى ٧ أسابيع. عُدِّل المعلف الحوضي بربط شبكة واقية ٤×٤ سم. أما المعلف الأنبوبي، فقد عُدِّل طوله من ٦ سم إلى ٤ سم. أظهرت النتائج فروقًا معنوية في فاقد العلف بين نوعي المعالف باختلاف نوع العلف. بلغت نسبة الفاقد ٣,٩١٪ و١,٨٤٪ قبل التعديل وبعده، على التوالي عند التغذية على العلف المهروس. بينما بلغت ٨,١٧٪ و٢,١٠٪ قبل التعديل وبعده، على التوالي، عند التغذية على العلف المحبب. ومع ذلك، انخفض فقدان العلف مع تقدم عمر دجاج التسمين (انخفضت الخسائر من ٩,٩٣٪ في الأسبوع الرابع إلى ٢,٣٩٪ في الأسبوع السابع) وزاد فقدان العلف بشكل ملحوظ عند التغذية على العلف المحبب (فقدان = ١٠,٧٦٪) مقارنةً بالعلف المهروس (فقدان العلف = ٢,٦٠٪). وكانت معدلات تحويل الجسم ١,٩٣ و١,٨٨ عند استخدام أنواع المعالف الحوضية والأنبوبية على التوالي. وانخفضت خسائر العلف من ٧,٣٢٪ إلى ٠,٧٥٪ ومن ٦,٠٤٪ إلى ١,٩٧٪ للأنبوبية والحوضية المعدلة على التوالي. وفي الختام، انخفض فقدان العلف مع زيادة عمر دجاج التسمين وكان معدل الفقد أعلى عند استخدام العلف المحبب مقارنةً بالعلف المهروس. باختصار، لم يكن لنوع المعلف لوحده تأثير كبير على فقدان العلف، على الرغم من انخفاض فقدان العلف بشكل كبير، وتحسن نسبة تحويل الجسم باستخدام المعالف المعدلة.



**الكلمات المفتاحية:** عمر الدجاج اللاحم، بقايا العلف، العلف المحبب والهريس (الناعم)، أنواع المعالف