

The Effects of Immediate Feeding in Delivery Boxes Posthatch on Growth Performance of Turkey Poults^a

Sabri Arda Eratalar^{1*} Mesut Türkoğlu²

¹Department of Poultry Science, Faculty of Agriculture and Natural Sciences, Abant İzzet Baysal University, Bolu

²Department of Animal Science, Faculty of Agriculture, Ankara University, Ankara

Received: 16.03.2017

Accepted: 26.05.2017

Keywords:

Early feeding, turkey poults, performance

*Corresponding author

ardaeratalar@ibu.edu.tr

Abstract. The study was carried out to evaluate the effects of early feeding on development of turkey poults. A total of 414 day-old Nicholas turkey poults were obtained from a hatchery of an integration in Bolu province for the two experiments. The poults are divided into two groups, which are the poults fed with starter diet and the fasted (control) group of birds in each experiment. Experiments were held in summer and in winter periods respectively. The effects of early feeding on the transportation boxes to the live weight is observed at 1, 2, 4, 6. weeks of life and liveability of the poults are controlled daily. Corresponding to the data obtained in this research, we concluded that poults allowed to access early feeding had better ($P<0.05$) live weights during the first week of their lives. But this advantage ended in the second week and didn't show up again during the 6 weeks' time ($P>0.05$). The mortality was observed to be higher in fasted groups. Feed consumption of the groups also seemed not to be affected by the application.

Hindi Palazlarının Yumurtadan Çıkışı Takiben Nakil Kutularında Hemen Yemlenmesinin Palazlarda Gelişim Performansına Etkisi

Anahtar kelimeler:

Erken yemleme, hindi palazı, performans

Özet. Bu çalışma, hindi palazlarının canlı ağırlık artışları üzerine erken beslemenin etkilerini değerlendirmek amacıyla yürütülmüştür. İki kez gerçekleştirilen denemelerde toplam 414 adet hindi palazı kullanılmıştır. Canlı materyal Bolu ilindeki bir entegre kuruluşa ait kuluçkahaneden temin edilmiştir. Her iki denemede de hindi palazları erken yemlenen ve aç bırakılan (kontrol) olarak iki gruba ayrılmıştır. Denemeler, sırasıyla yaz ve kış döneminde gerçekleştirilmiştir. Nakil kutularında hemen yemlemenin 1., 2., 4. ve 6. hafta canlı ağırlıklarına etkisi araştırılmış, yem tüketim ve ölüm oranı günlük olarak takip edilmiştir. Çalışmanın sonuçlarına göre ilk hafta canlı ağırlık bakımından erken yeme ulaşan grup daha yüksek bir değer sergilemekle beraber ($P<0.05$), ikinci haftadan sonra geç yemlenen grup diğer palaz grubuna yetişmiş ve kesim yaşına kadar değişik bir durum ortaya çıkmamıştır ($P>0.05$). Erken yeme ulaştırılan grupta ölüm oranı düşük olarak gözlemlenmiştir. Gruplarda yem değerlendirmenin de uygulamadan etkilenmediği gözlemlenmiştir.

INTRODUCTION

Considering the poultry meat production in the world, chicken meat takes the first place where turkey meat comes second. In Turkey the situation is just the same. In Turkey, especially since the establishment of the first commercial turkey meat production facility, turkey meat production began to increase. In 1995, the consumption was 2.600 tons where today is more than 56.000 tons per year. Turkey meat is reliable to be further processed like other sources of poultry meat. Also, turkey meat has an advantage to contain more and bigger whole meat to be more easily further processed. In Turkey white turkeys are often used by several private companies yearlong for turkey meat production. And very little amount of turkeys are reared by the hand of village farmers. The chicks are obtained from government production farms and several small hatcheries. Those birds are culled and their meat is sold in local small village marketplaces. The fundamental of economy is based on sales. There countries current account deficit can be eliminated by having more exportation than importation. A country should at least be self-sufficient in one production branch to help decreasing the account deficit. Self-sufficiency seems to become one of the major points for our country for the next decade. Turkey meat is a very important source of animal based protein for our country as it is for the rest of the world. So, it is important to increase the quality of the end product. A serious amount of increase in production can be achieved by increasing the number of birds reared but also by decreasing the mortality or increasing the performance during the rearing period (Eratarlar and Bulut 2007).

The rearing period for male turkeys is 16 - 20 weeks and for females is 12 - 16 weeks for large white turkeys, where the starter period is for the first 6 weeks for both males and females. The poults can be transferred to rearing farms after starter period or can also be raised in the same house for the remaining lifespan. During the whole rearing period the most sensitive time is the first week for turkeys. During this time the performance of the birds is the main factor affecting total yield produced and overall productivity (Türkoğlu and Sarıca 2014).

The main factors effecting productivity and mortality are the achievability of required environmental conditions in the rearing house, obtaining high quality feed and getting a good quality chick from the hatcheries. In the frame of these factors, the future performance of the birds can be positively affected. The future performance is set by today's

applications bringing us the term "it goes on like how you begin".

Early feeding is a subject that is popularly investigated in the last years. It is found to be positive for growth performance in the chicken (Noy and Sklan 1999). As being an important source of protein and white meat, it should be investigated in turkeys which may have the same positive effects with little and easy early feeding practices. By these practices, an increase in the performance of these birds or increase in livability may occur resulting in a contribution to the economy.

The biggest problem in the turkey industry can be the high mortality rates mostly originating from the first 3 weeks. Undoubtedly, this is because of the fragileness coming from the genetic construct of the animals and also rearing house environmental conditions such as obtaining enough amounts of feeders and drinkers or heat and humidity. One other reason can be the chick quality coming from the hatcheries. Some academicians imply that, this issue is coming from the immune system which is not yet sufficiently developed in the early ages of their lives (Dibner *et al.*, 1998, Pinchasov and Noy 1993). Some other researchers say that, early age mortality comes from the fragility of these animals originating from underdeveloped digestive tracts of the birds (Noy and Sklan 1999; Murakami *et al.*, 1992; Uni 1998). It is implied by some researchers that the digestive system of the birds should be stimulated by getting feed material as early as possible after hatch (Noy and Sklan 1997; Noy and Sklan 1998; Casteel *et al.*, 1994).

As a summary, research on chicks and turkey poults show that it is a necessity for these birds to ingest some feed as early as possible after hatch to obtain a healthy digestive tract and a good immune system to have a better future health, endurance to the diseases, lower mortality and higher performance.

Today, the slaughter weight of white turkeys reaches 22 kg in males and 16 kg in females (BUT 2016). In our country most of the turkey rearing houses can accommodate 5000 birds. Thus, a 25 gr increase in live weight per bird can make a good contribution to the economy. This means an increase of 125 kg total meat produced in each house. Also, a possible decrease in mortality of 0.5% can result in an increase of 3 - 4 tons of live weight meaning 2 - 3 tons of meat produced from the same house. There would be an even greater economical increase for the farmers and companies.

The research has been undertaken to investigate

the effect of early feeding of hatched birds on live weight and feed consumption and mortality were also followed.

MATERIALS AND METHODS

Material

Live material

Live material of the research was obtained from a private company specialized in turkey meat production formed in Bolu. Live material of the research was 414 turkey poults which were obtained from the company. The research was done twice. In the first (summer) research trial group and control group consisted of 105 poults each and 210 birds total. In the second (winter) research trial group and control group consisted of 102 poults each and 204 birds total.

Feed material

In the trials the feed produced by the private company was used. Two types of feed were used and the ingredients of these feed were given in Table 1. Experimental turkey poult diets are formed from beginner feed (1) and turkey poult grower feed (2). Right after hatch until the beginning of the fourth week feed number 1 was given, for the last 3 weeks feed number 2 was given to the birds ad-libitum. At the hatchery right after hatch, the early fed (trial) group was given feed number 1 after the feed is wet till humidity of the feed reaches 36% by purified water. The feed material for the whole production period consists mainly of soy pulp, grain corn, bone-meal, molasses.

Hatchery practices

Incubation period took place in fully automatic Petersime P - 13 industrial turkey hatchers. Standard procedure was carried out with no interference to the hatcher. No manipulation was carried out on birds or on the machine controls.

Rearing house and trial pens

Both trials took place in a contracted farmer's rearing house in Bolu Örencik Village. The farm had the capacity of rearing 35000 poults per production period in fully automatic houses. The houses were heated by automatic hazelnut shell stoves. The house had high isolation standards, achieving the inside temperature stable.

Two pens were built inside the house with the dimensions of 2.75 m length, 3.25 m width and 1.70 m height. Construction was made by profile iron and bird wires with a door made by the same material.

Table 1. The chemical ingredients and physical properties of the feed used in the trials.

Çizelge 1. Denemelerde kullanılan yemin kimyasal içeriği ve fiziksel özellikleri.

| Feed Chemical and Physical Properties | Starter (1) (0-3 week) | Grower (2) (4-6 week) |
|--|-----------------------------------|----------------------------------|
| Crude protein (%) | 28 | 26 |
| Metabolisable energy (Kcal kg⁻¹) | 2900 | 3000 |
| Methionine | 0.70 | 0.65 |
| Methionine+Sistine | 1.17 | 1.07 |
| Lysine | 1.80 | 1.70 |
| Calcium | 1.40 | 1.40 |
| Digestible phosphorus | 0.77 | 0.75 |
| Sodium | 0.17 | 0.17 |
| Threonine | 1.10 | 1.01 |
| Tryptophan | 0.30 | 0.27 |
| Arginine | 1.94 | 1.79 |
| Physical type of feed | Ground Pellet | Pellet |

Research equipment

To ensure the data a etiquette numerator gun and a notex writer was used to tag each bird with unique numbers.

For appropriate measurement of the live weights of birds a laboratory scale with 0.01 gr sensitivity was used during the research.

Method

Trial was done twice. First trial was done in summer period 18 July - 29 August and the second trial took place in the winter period 18 October - 27 December. This is set to find out if there is a seasonal difference about the research topic.

In both trials the hatching eggs from the same parent stock of big white turkeys were used.

Research was first conducted at the hatchery of the private company which also provided feed, poults and the house used in the trial. Right after hatching all the poults were weighed with the laboratory scale and tagged with unique numbers with the etiquette gun and plastic numbers. The weights of the birds were recorded individually.

Poults were taken from the hatching trays and transferred to the transport boxes which were previously set with grooved floor paper with wet feed was put on 10 g for each bird. The control group's boxes had only grooved floor papers without feed to investigate the difference of early feeding application.

All poults were kept under 26°C temperature and 49% humidity for 12 hours. After the waiting period, poults were immediately transferred to the rearing house.

Poults were set in the brooders for the first week of rearing period.

Newcastle vaccine was done by eyedrop method when birds are set to the brooders.

Poults were fed ad libitum during the trial and had free excess to water for the whole lifetime. No change about feeding was done in the experiment but just the feed has changed from number 1 to number 2 at the 22nd day of life.

For the first 3 days of life 200 gr vitamin C dissolved in 400 lt of water was given the birds to drink. For the rest of the rearing period poults only drank natural water.

At 6 days of age beak trimming was done by a cauterizer at the 1/3rd of the beak individually.

At the end of the first week poults were taken out of the brooders (rings) and set in the coequal pens where they will have spent the rest of their lives. Those pens had equal environmental quality, assuring the same amount of air, lighting, ventilation, feeder and drinker space. There were hanging big type feeders and hanging type bell drinkers available. The pens were made of iron profiles and were covered with bird wires.

Live weight measurements were taken after 12 hours of hatch, 1, 2, 4 and 6 weeks time by the laboratory scale. Trials were ended at 6 weeks.

After hatch (eyedrop) Newcastle, at 7th day Turkey Rhino Tracheitis (TRT - spray), at 21st day Newcastle (spray), at 35th day Turkey Rhino Tracheitis (TRT - spray) and 56th day Newcastle (spray) vaccines were applied by the veterinarian of the company.

The mortality and feed consumption data from the fed group (trial) and the fasted (control) group were given for information but no statistical analysis were made. The live weight data obtained passed the homogeneity tests and were statistically analyzed by computer with Minitab 14 software using t- test (MINITAB 14 2004).

RESULTS AND DISCUSSION

Live Weight

The data of the both trials about the change in live weight of the fasted and fed groups are given in Table 2 and 3. Analyses were made from the data which were obtained by individually weighed poults.

Experimental data obtained from the trials, early feeding of the heavy white turkey poults for the first

Table 2. Live weights obtained from the summer (first) trial in the summer period (P>0.05).

Çizelge 2. Yaz döneminde gerçekleştirilen (1.) denemeden elde edilen canlı ağırlıklar (P>0.05).

| Time | Group | \bar{X} | S \bar{x} |
|-------------|-------|----------------------|-------------|
| After Hatch | EF | 60.544 | 0.625 |
| | C | 60.516 | 0.630 |
| 12 Hours | EF | 58.697 | 1.135 |
| | C | 58.269 | 0.089 |
| 1. Week | EF | 162.690 ^a | 18.050 |
| | C | 155.670 ^b | 18.490 |
| 2. Week | EF | 335.850 | 41.050 |
| | C | 330.640 | 44.250 |
| 4. Week | EF | 999.300 | 123.600 |
| | C | 1034.400 | 143.200 |
| 6. Week | EF | 1967.500 | 297.000 |
| | C | 1973.700 | 283.800 |

The statistically different data is shown as small uppercase characters (P<0,05); EF:Early Fed, C: Fasted.

Table 3. Live weights obtained from the winter (second) trial in the winter period (P>0.05).

Çizelge 3. Kış döneminde gerçekleştirilen (2.) denemeden elde edilen canlı ağırlıklar (P>0.05).

| Time | Group | \bar{X} | S \bar{x} |
|-------------|-------|----------------------|-------------|
| After Hatch | EF | 57.599 | 3.637 |
| | C | 57.570 | 3.649 |
| 12 Hours | EF | 56.626 | 3.452 |
| | C | 55.396 | 3.446 |
| 1. Week | EF | 157.730 ^a | 18.710 |
| | C | 151.960 ^b | 15.950 |
| 2. Week | EF | 361.110 | 42.090 |
| | C | 353.720 | 35.440 |
| 4. Week | EF | 1123.600 | 114.800 |
| | C | 1096.100 | 116.400 |
| 6. Week | EF | 2225.400 | 259.500 |
| | C | 2197.200 | 284.900 |

The statistically different data is shown as small uppercase characters (P<0,05); EF:Early Fed, C: Fasted.

12 hour period right after hatch improved the first week live weight. This affect lost its significance thereafter according to the statistics done. This situation is very similar to the research of Noy ve Sklan (1999, 2001) who imply that the positive effects of early feeding on the live weights of broiler chicks lost its significance after 2 weeks. This difference between chicken and turkeys can be explained with the difference between body weights and sizes of these different races. The chicken has a higher metabolism rate than the turkeys. Also the researchers say that the

live weight difference closes down between the groups in a period of time and fasted birds reaches the live weights of the early fed ones. At 6 weeks of age, according to the researchers there has been no significant difference between the groups in terms of live weight. In another research Halevy *et al.* (2003) tried a longer fasting for birds and imply that a 48 hour fasting period after hatch ends in a lower live weight at 19 days.

Ganjali *et al.* (2015) examined 6, 12, 18 hour delayed feeding in terms of performance and histological findings in small intestines. It has been reported that those who fasted for 6 hours after hatch showed better performance at 10 days of age in terms of live weight and live weight increase than those starved for 12 and 18 hours.

It is an easy application to feed the poultry in delivery boxes immediately at the time of transferring poults to the rearing houses. It does not require additional work. It will be seen that the cost of this application can be easily implemented by integrated organizations if it is considered that feeding up to 10 gr of feed per poult early after hatch till the transfer is sufficient.

As noted in Noy and Sklan (1999), early feeding is important for intestinal growth and general development in living organisms. In this way the egg yolk is also absorbed earlier. It has been stated that living organisms will begin to grow early with the ingestion of the feed to the digestive tract at the earliest time, and early growing birds may be more durable than late growing ones. It can be considered that the difference in livability has come about this way.

Asaf *et al.* (2001) reported that a feed restriction situation at any stage of life negatively affects the livability. It is stated that the hunger affects mortality rate to increase especially at early days of life. It can be thought that on the first days of life, the deaths of turkeys are largely due to the lack of food called starvation.

According to the results of Pinchasov and Noy (1993), weight loss is also increasing with the increase of starvation time for chickens and turkeys after hatching. While the weight loss in the 24-hour standby is 13%, this loss reaches 20% in 48 hours.

Petek (2000) reported that chicks could not get enough nutrients after hatching with egg yolk. Researcher also implies that early allowance to feed and water would prevent weight loss. Xin (1997) also reports that most deaths of the chickens and turkey hatchlings which hatched simultaneously may have

died because of dehydration inside the hatcher resulting from starvation.

Mortality

In both trials, mortality was seen only in the fasted groups. Five died in the summer (first) trial and four in the winter (second) trial.

The total mortality rate detected in the trials can be supported by Dibner *et al.* (1998) suggesting that the immune system of birds may begin to develop early in the animal, and that in later ages, this development is likely to increase. This immunological development and higher levels of immunity at the advancing ages can be explained in this way.

Xin (1997) and Petek (2000) stated that fasting, affects mortality early stages of life and also in later ages.

Dibner *et al.* (1998) stated that early feeding increased Bursa weight, which in turn triggered the activation of the immune system and thus the immune system began to develop, thereby indicating that early hunger at a high rate of mortality was a serious factor, which was also a high stressor.

Since early activation through early feeding in the digestive system may be a matter of question, it will be useful to investigate this case deeper by researchers as well.

Feed Consumption

In order to detect the healthiness of the experiment, feed consumption values were obtained from both experiments are given in Table 4 as a total. The data are in line with data obtained during a normal operating period. There has been no statistical application on feed consumption data.

CONCLUSION

Noy and Sklan (1998) reported that an increase in the size of the breast meat was not studied in the trial. It will be useful to carry out research on this subject in the future and make it clear by reason.

Simon *et al.* (2015) reported that early allowance of the animal to feed and water at the beginning of life is very important for the development of the immune system and that the immune response may be faster during the next life. In this regard, early feeding should be discussed in more detail.

Saki (2005) reported immediate (early) fed animals performed better than those who were fasted for 24 hours.

The research focused on the live weight gain, which can be regarded as the most important performance

Table 4. Mean live weight, and feed conversion ratio values obtained from the trials.

Çizelge 4. Denemelerden elde edilen ortalama canlı ağırlık ve yem dönüşüm oranları.

| Week | Parameters | Summer (Trial 1) | | Winter (Trial 2) | |
|------|------------|------------------|--------------|------------------|--------------|
| | | EF | C | EF | C |
| 1 | FCR | 1.2744 | 1.2734 | 1.1942 | 1.2011 |
| | MLW | 162.69±18.05 | 155.67±18.49 | 157.73±18.71 | 151.96±15.95 |
| 2 | FCR | 1.3716 | 1.3706 | 1.2853 | 1.2831 |
| | MLW | 335.85±41.05 | 330.64±44.25 | 361.11±42.09 | 353.72±35.44 |
| 4 | FCR | 1.5552 | 1.5542 | 1.4573 | 1.4567 |
| | MLW | 999.3±123.6 | 1034.4±143.2 | 1123±114.8 | 1096.1±116.4 |
| 6 | FCR | 1.7504 | 1.7499 | 1.6378 | 1.6389 |
| | MLW | 1967.5±297 | 1973.7±297 | 2225.4±259.5 | 2197.2±284.9 |

Feed conversion ratio: FCR; MLW: Mean live weight (gr), EF: Early fed; C: Fasted.

criterion in meat turkey production. From the obtained findings, it was observed that the live weight gain was affected within the first 2 weeks, and in the second week the fed group had a higher live weight than the 12 hour fasted ones which was statistically significant.

As found in the findings of some other researches, it was determined that the live weight of the early fed turkey poults was higher than the live weight of the fasted group in the first week. This statistically significant difference in body weight, although preserved over time, lost its significance at second week of life in both the summer and winter periods.

Some researchers according to their studies have made comments that it is possible to bring some benefits, such as early activation of the digestive tract, and early development of the immune system may have come of early access to feed and water. Such interpretations need more detailed work and analysis. Intestinal villains are more developed says Noy and Sklan (2001). The researchers imply that Villus constructions are more advanced in early fed chicks which can be considered as a sign of this development.

In conclusion, it is considered that early feeding of turkey poultry may provide additional added value for the animals to start early development and to have higher live weight in all life stages. Considering that the digestive systems of these poults are more advanced, we think that it will be useful to organize more detailed studies on these issues. It will also be appropriate and profitable to increase the productivity of these poults with various practical methods of early feeding in the hatcheries terms of easy and economical application.

REFERENCES

- Asaf G., Uni Z and Sklan D., 2001. The effect of fasting at different ages on growth and tissue dynamics in the small intestine of young chick. *British Journal of Nutrition*, 86: 53-61.
- BUT, 2016. *British United Turkeys Production Manual*, London.
- Casteel ET., Wilson JL., Buhr RJ and Sander JE., 1994. The influence of extended posthatch holding time and placement density on broiler performance. *Poultry Science*, 73: 1679-1684.
- Dibner JJ., Knight CD., Kitchell ML., Atwell CA., Downs AC and Ivey FJ., 1998. Early feeding and development of the immune system in neonatal poultry. *Journal of Applied Poultry Research*, 7: 425-436.
- Eratarlar SA and Bulut O., 2007. Türkiye'de hindi yetiştiriciliği. *Veteriner Tavukçuluk Derneği Dergisi*, 5(3): 11-19.
- Ganjali H., Raji AR and Zarghi H., 2015. Effect of post hatch delayed access to feed on performance, gut physical and histological development and yolk absorption in young broiler chicks. *Biomedical and Pharmacology Journal*, 8(2): 945-955.
- Halevy O., Nadel Y., Barak M., Rozenboim I and Sklan D., 2003. Early posthatch feeding stimulates cell proliferation and skeletal muscle growth in Turkey poults. *The Journal of Nutrition*, 133(5): 1376-1382.
- MINITAB 14, 2004. *Statistical Software*. Minitab Inc. Quality Plaza, 1829 Pine Hall Road State College, PA 16801-3008, USA.
- Murakami H., Akiba Y and Horiguchi M., 1992. Growth and utilization of nutrients in newly hatched chick with or without removal of residual yolk. *Growth, Development and Aging*, 56: 75-84.
- Noy Y and Sklan D., 1997. Posthatch development in poultry. *Journal of Applied Poultry Research*, 6: 344-354.

- Noy Y and Sklan D., 1998. Yolk utilization in the newly hatched poult. *British Poultry Science*, 39: 446-451.
- Noy Y and Sklan D., 1999. Different types of early feeding and performance in chicks and poults. *Journal of Applied Poultry Research*, 8: 16-24.
- Noy Y and Sklan D., 2001. Yolk and exogenous feed utilization in the posthatch chick. *Poultry Science*, 80: 1490-1492.
- Petek M., 2000. Broiler civcivlerde neonatal beslemenin önemi. *Tavukçunun Sesi*, Temmuz: 20-24.
- Pinchasov Y and Noy Y., 1993. Comparison of post-hatch holding time and subsequent early performance of broiler chicks and Turkey poults. *British Poultry Science*, 9: 142-148.
- Saki AA., 2005. Effect of post-hatch feeding on broiler performance. *International Journal of Poultry Science*, 4(1): 4-6.
- Simon KG., de Vries Reilingh JE., Kemp BB and Lammers A., 2015. Early feeding and early life housing conditions influence the response towards a noninfectious lung challenge in broilers. *Poultry Science*, 94(9): 2041-2048.
- Türkođlu M and Sarıca M., 2014. *Tavukçuluk Bilimi, Yetiştirme, Besleme, Hastalıklar*. Bey Ofset Matbaacılık, Ankara.
- Uni Z., 1998. Impact of Early Nutrition on Poultry: Review of Presentations. *Applied Poultry Science*, Inc.
- Xin H., 1997. Phsiological evaluation of chick morbidity during extended posthatch holding. *Journal of Applied Poultry Research*, 6: 417-421.