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Short Communication / *Kısa Bilimsel Çalışma*

Gross appearance of the chicken unfertilized germinal disc

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Summary: Flock fertility could be determined by different appearances of germinal disc in fresh egg. The aim of this study was to determine the differences and the frequency of distributions in the appearance of germinal disc in fresh unfertile eggs coming from a young virgin brown layer flock. In this study a total of 354 eggs was examined. Six categories of unfertile germinal disc (UGD) were defined based on their appearance as A, B, C, D, E and F. As a conclusion, in total eggs, type A (31.9%) was the highest and type C was the lowest (6.5%) in frequency.

Key words: Chicken, unfertilized germinal disc, gross appearance.

Dölsüz tavuk germinal diskinin görünümü

Özet: Sürü döllülüğü taze yumurtadaki germinal diskin farklı görünümüne göre belirlenebilir. Bu çalışmada; genç kahverengi yumurtacı sürüden elde edilen taze dölsüz yumurtalardaki germinal disk farklılıklarını ve dağılım frekanslarını belirlemek amaçlanmıştır. Çalışmada toplam 354 yumurta incelenmiştir. Yumurtalar dölsüz germinal disk görünümüne göre A, B, C, D, E ve F olmak üzere 6 farklı şekilde sınıflandırılmıştır. Sonuç olarak toplam yumurtalar içinde en yüksek oranda A şekline (%31.9) ve en düşük oranda da C şekline (%6.5) rastlanmıştır.

Anahtar sözcükler: Tavuk, dölsüz germinal disk, görünüm.

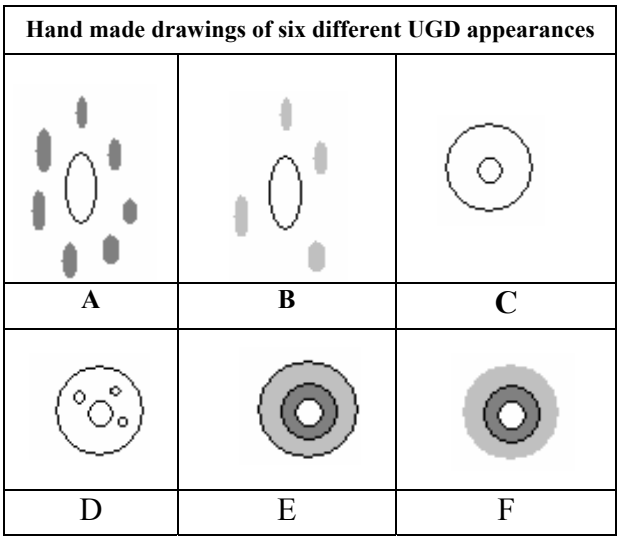
The fresh egg examination is a method of predicting hatch potential prior to setting of the eggs. External and internal examination of the eggs will serve as an early warning system for breeder flock problems, the quality characteristics of shell, albumen and yolk, nutritional and disease status of the breeder and fertility status of the eggs (3).

Internal examination of the eggs can be made by the breakout of the culled fresh hatching eggs. Fresh egg breakout should be used when immediate fertility results are needed. When a flock is first coming in to lay or has been treated for a disease or management related fertility problem, managers often want a quick estimate of fertility (9). For the fertility estimation, appearances of unfertile germinal disc, blastoderm (fertilized germinal disc) and early dead embryo could be well recognized and differentiated (5, 10).

Arora and Kosin (1) briefly described the gross appearance of germinal disc in different avian species including chicken. They reported that presence of vacuoles in the germinal disc as the indicator of an infertile egg and presence of vacuoles in the blastoderm as an indicator of embryonic death. Some researchers (4,7) categorized the early development of the chicken embryo. The progressive development of the turkey embryo from cleavage through hypoblast formation was described by Gupta and Bakst (6). It became apparent that there were variations in the morphological appearance of blastoderm and as well as UGD in the fresh laid eggs. Gross appearance of the turkey blastoderm and UGD at oviposition also described and categorized by Bakst et al (2). They indicated that UGD were divided into six categories and were best differentiated from the blastoderms by the presence of vacuoles around its central dense area.

The aim of this study was to determine the differences and the frequency of distributions in the appearance of germinal disc in fresh unfertile eggs coming from a young virgin brown layer flock. It was assumed that the explanations of the morphological categories and their frequencies may reflect some contributions to fresh egg breakout practices.

Eggs were randomly collected four times in two weeks of intervals from uninseminated brown layer flock of 1200 hens between 26 to 32 weeks of age. The total number of eggs examined was 354. Eggs were collected once in the morning and placed in a room at 15 ^{o}C and examined in the next day.



A; It has a central, dense, small, asymmetrical, white spot which appears irregular due to numerous adjacent small vacuoles. B; Similar to A but vacuoles less conspicuous by eye. C; Has large, dense, somewhat symmetrical, white mass with surrounded by a clear zone. D; Like C but has one or more vacuoles surrounding central white mass. Surrounded by a clear zone. E; Three distinct zones, a dense central white area, surrounded by symmetrical. F; Similar to E except the outer ring is more diffuse with no outer boundary (Adapted from Bakst et al, 1998).

Figure 1. Morphological classifications of the unfertile germinal disc (UGD)
Şekil 1. Dölsüz germinal diskin morfolojik sınıflandırılması

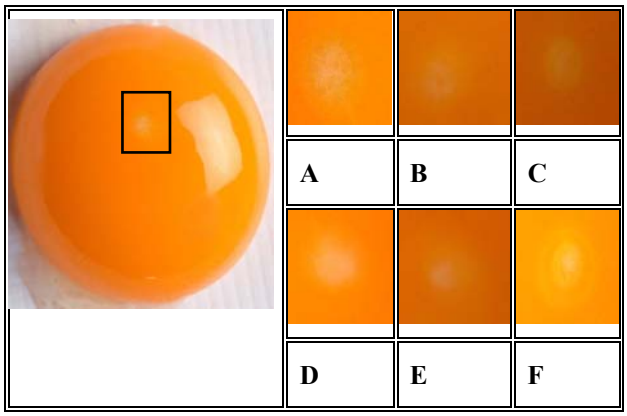


Figure 2. Appearance of six different unfertile germinal disc (UGD).
Şekil 2. Altı farklı dölsüz germinal diskin görünümü

Fresh egg breakout was demonstrated by puncturing the egg shell and shell membranes from the large side of the egg to have a 25 or 30 mm diameter opening. To locate the germinal disc it was necessary to discard some of the albumen and roll the yolk inside the shell or in the palm of the hand. Each time UGD classified in one of the six different morphologic categories in according to gross appearance (2) (Figure 1). Six categories of UGD A, B, C, D, E and F have defined in according to appearances of central white spot, presence of vacuoles and zones surrounding the central spot (2). In two of the categories marked as A and B, the central white spot was asymmetrical. In the categories of A, B and D, there were small vacuoles surrounding the central white spot in different frequency distributions. In the categories of C, D, E and F there were surrounding zones around the white spot in different appearances (Figure 1 and Figure 2). A statistical analysis of the distribution of the classifications of the UGD appearance within and between each egg collection group was made by using of Chi-Square test (8) using the SPSS version 10.0.

Egg numbers and frequencies in those categories are shown in Table 1. No significant differences were obtained among the egg collection intervals. Egg distribution differences were statistically significant among the categories ($p<0.001$) in the first, second, third period and in total. When analyzed all together, type A (31.9%) was the highest and type C was the lowest (6.5%) in frequency.

Table 1.The distribution ratio of six different unfertile germinal disc (UGD)
Tablo 1. Altı farklı dölsüz germinal diskin dağılım oranı

Time		Categories of UGD appearances						Total
		A	B	C	D	E	F	
1	n	23	14	2	11	20	14	84
	%	27.4[a]	16.7[a]	2.4[b]	13.1[a]	23.8[a]	16.7[a]	100
2	n	29	16	6	13	19	7	90
	%	32.2[a]	17.8[b]	6.7[b]	14.4[b]	21.1[b]	7.8[b]	100
3	n	34	12	4	14	18	8	90
	%	37.8[a]	13.3[b]	4.4[b]	15.6[b]	20.0[b]	8.9[b]	100
4	n	27	11	11	11	17	13	90
	%	30.0	12.2	12.2	12.2	18.9	14.4	100
Total	n	113	53	23	49	74	42	354
	%	31.9[a]	15.0[b]	6.5[c]	13.8[b]	20.9[b]	11.9[b]	100

[a-c] Percentages of groups with different letters in the same row are significant ($p<0.001$).

True flock fertility determinations based on germinal disc appearances in fresh laid eggs is a practical tool for the hatchery practice that is becoming an increasingly popular recently. Gross appearance of the UGD and fertilized germinal disc (blastoderm) at oviposition exhibits definable morphological variations. Such variations may lead to difficulty and misjudgement when attempting to determine true flock fertility based on their appearances.

Gross morphological appearance of chicken UGD were observed by unaided eye in the eggs coming from a virgin brown layer flock in between 26 and 32 weeks of age. In this experiment; six categories of UGD were

defined based on their appearance as A, B, C, D, E and F and type A (31.9%) was observed in the highest frequency.

These findings were almost in the same order with the findings of Bakst et al (2) on turkey UGD. Most of the authors in some pioneer papers published in between 1872 and 1961 cited the presence of vacuoles in the germinal disc as the indicator of an infertile egg (1). But in our findings no vacuoles observed by unaided eye in some of UDG categories such as type C, E and F.

As a result it may be stated that the gross appearance of UGD may be put into six different categories. These appearances may be used as a tool to differentiate an UGD from the blastoderm.

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