

## HATCHABILITY OF FAYOUMI, BALADY, RHODE ISLAND RED CHICKENS AND THEIR CROSSES

By

M. T. RAGAB, M. A. GHANY AND M. K. SAMKARI\*

*Dept. of Animal Production, Faculty of Agriculture, Cairo University*

### SUMMARY

To compare the reproductive characteristics of Fayoumi, Balady, Rhode Island Red and their  $F_1$  and  $F_2$  crosses, an experiment was done at the Poultry Research Center, Faculty of Agriculture, Cairo University; covering a total number of nearly 9000 eggs from the different groups, during the period from January to April 1961. The results obtained could be summarized as follows:

(1) Fayoumi cockerels showed the highest fertility in pure and cross breeding. Crosses related to R.I.R. males were of higher fertility than reciprocals related to Baladi cockerels. The data suggest that sex linkage is involved.

(2) Lower fertility resulted in the  $F_1$  crosses than in pure breeds and  $F_2$  crosses. This might be attributed to physical handicaps in matings.

(3) Crosses were generally of higher hatchability than pure breeds, with those related to R.I.R. sires being superior to comparative mates with local cockerels. Sex linked inheritance and improved genetic constitution may be behind this difference.

(4) Embryonic mortality was highest during the third week of incubation in all groups, although tended to slow down in the crosses than the parent's average.

### INTRODUCTION

Chick hatchability decides to a great extent the prospective profitability of a poultry project. Breed differences were observed in this respect by Mahadevan (1954), Amer (1956), Ghany, (1960) and El-Boushy (1961). Strain and breed crosses used as a means for improving fertility and hatchability have yielded contradicting results. King and Brunner (1952) and Ragab et al (1955, 1956) reported that crossing improved hatchability while Nordskog and Ghostley (1954) and Nordskog and Philips (1960) failed to find similar improvement.

The present work was carried to secure additional data on the subject, using two indigenous breeds, Fayoumi and Baladi, in comparison with Rhode Island Red and different crosses between R.I.R. and both local breeds.

(\*) Agric. and Anim Prod. Dept., Min. of Agrarian Ref., Damascus, Syria.

## MATERIALS AND METHODS

Pure and crossbred groups of birds were available for breeding at the Poultry Research Station, Fac. of Agriculture, Cairo University. Thirteen hatches were obtained during the period from January 15 to April 16, 1961. Eggs were set weekly and candled for infertility and dead embryos at the 7<sup>th</sup> and 14<sup>th</sup> days of incubation. Candling results were confirmed by breaking out eggs. At the eighteenth day of incubation eggs were pedigreed according to their breeding and transferred to separated hatches. Hatched chicks and dead-in-shells were counted on the morning of the 22<sup>nd</sup> day of incubation. Failing to hatch embryos were examined for age classification.

The birds were kept in flock breeding pens with brick houses and open shady yards. The mating system was arranged so that pure and crossbred hatching eggs could be collected from hens mated to the same group of cockerels. In that, the hens were mated as follows :

Pen 1 : Headed by Fayoumi (F.) cockerels with the following females of :

- (a) Fayoumi (F)
- (b) Rhode Island Red (R)
- (c) Reciprocal F<sub>1</sub> crosses between Rhode Island and Fayoumi (RF ; FR).

Pen 2 : Headed by Baladi (B) cockerels mated to the following female groups:

- (a) Baladi (B)
- (b) Rhode Island Red (R)
- (c) Reciprocal F<sub>1</sub> crosses between Rhode Island and Baladi (RB ; BR)

Pen 3 : Headed by Rhode Island Red (R) cockerels with the following mates :

- (a) Rhode Island Red (R)
- (b) Fayoumi (F)
- (c) Baladi (B)
- (d) Reciprocal F<sub>1</sub> crosses between Rhode Island and Fayoumi (RF ; FR)
- (e) Reciprocal F<sub>1</sub> crosses between Rhode Island and Baladi (RB ; BR)

The three pens were managed alike. The ration used was composed of : Corn 19%, Barley 15%, Bean 15%, wheat 10%, Wheat bran 13%, Rice bran 13% and decorticated cotton seed meal 15%. Daily additions of 0.5% salt, 1.5% limestone, 2% fresh blood and 2% fresh skin milk were mixed with the ration. One kilogram of Egyptian green clover (Berseem), per each ten birds, was offered at mid-day.

## RESULTS AND DISCUSSIONS

## 1. Fertility :

As shown in Table 1, fertility in Rhode Island Red eggs was poorer than in either Fayoumi or Baladi breeds. Ghany (1960) found similar results under the Liberation Province conditions. This poor performance of R.I.R. may be due to genetical causes worthy of investigation. The  $F_1$  crosses had lower fertility than  $F_2$  crosses. This might be related to their difficulty in copulation due to differences in body size of mates. In both  $F_1$  and  $F_2$  crosses Fayoumi sired groups showed the highest fertilities. This could be attributed to better genetic viability and to their observed activity and persistency in mating. Crosses related to Rhode Island Red cockerels were of better fertility than those of Baladi sires. Breed differences in mating behaviour and gametic combinability may be the causes for much results, although more work is recommended for clear verification. Jull (1935), Hays (1949) and Nordskog and Phillips (1960) referred to the inheritance of fertility and the beneficial advantage of crossing in this point.

## 2. Hatchability :

The differences in hatchability between pure and crossbred groups were small, but tended to show a slight improvement as a result of crossing especially in the  $F_2$  groups, (Table 1). Crosses belonging to Rhode Island Red sires

TABLE 1.—Numbers of eggs set fertile and hatched with the percentages of fertility and hatchability for the different breeding groups .

Matings	Eggs Set	Fertile eggs		Hatched chicks	
	No.	No.	%	No.	%
<i>Pure breeds :</i>					
Fayoumi (F) . . . . .	1073	1014	94.5	907	89.4
Baladi (B) . . . . .	1007	873	86.7	770	88.2
Rhode Island Red (R)	439	310	70.6	266	85.8
<i>F<sub>1</sub> crosses :</i>					
Rhode × Fayoumi (R.F.)	951	657	69.1	590	89.8
Fayoumi × Rhode (F.R.)	404	311	77.1	274	88.0
Rhode × Baladi (R.B.)	944	692	73.2	631	91.3
Baladi × Rhode (B.R.)	391	247	62.7	207	84.1
<i>F<sub>2</sub> crosses :</i>					
Rhode × (RF+FR) . .	979	870	88.9	786	90.3
Fayoumi × (RF+FR) . .	920	850	92.4	753	88.6
Rhode × (RB+BR) . .	765	706	92.3	658	93.2
Baladi × (RB+BR) . .	1101	987	89.7	915	91.9

in either  $F_1$  or  $F_2$  groups showed better hatching percents than when using Fayoumi or Baladi males on the matching groups of females. Sex linked inheritance and genetic reasons may be responsible for this advantage.

### 3. Embryonic Mortality :

Total mortality rate was lower in crosses, especially the Baladi ones, than the average of involved pure breeds, (Table 2). In all groups, the peak of embryo-mortality took place during the last week of incubation while only few embryos died within the second week. Crosses showed a lesser percent of late-mortality than mid-parent average. This agrees with earlier results by Byerly et al (1934) and Helmy (1958) who attributed the hatchability benefit of crossing to less mortality percent at end of incubation.

TABLE 2. Embryonic mortality distribution for the Fayoumi, Baladi, Rhode Island Red and their crosses ( $F_1+F_2$ ).

Matings	Total Mortality		Weekly Mortality (%)		
	No.	%	1st week	2nd week	3rd week
Pure Fayoumi . . . . .	107	10.6	30.9	12.0	57.1
Pure Balady. . . . .	103	11.8	21.7	7.1	71.2
Pure Rhode Island Red . .	44	14.2	25.0	7.6	47.4
Fayoumi crosses ( $F_1+F_2$ ) .	294	10.9	28.9	10.1	61.0
Baladi crosses ( $F_1+F_2$ ) . .	211	8.0	32.3	14.6	53.1

\* Relative to total embryonic mortality.

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مقارنة بين المقدرة على الفقس في الدجاج  
الفيومي والبلدى والرودايلند  
والأفراد الخليط بينها

الملخص

أجريت هذه التجارب في مزرعة الدواجن الخاصة بقسم تربية الحيوان بكلية الزراعة بالجيزة وقد شملت ٩٠٠٠ بيضة من مجموعات مختلفة في المدة من يناير الى أبريل ١٩٦١ وقد تبين من نتائج هذا البحث ما يلي :

أولاً - يبلغ الخصب أقصاه في الديوك الفيومي سواء كان في استعمالها داخل النوع نفسه او للخلط مع أنواع اخرى . وقد تبين أيضا أن الافراد الخليطة الناتجة من تلقيح ديوك من الرودايلند مع أناث من أنواع اخرى كانت أعلى خصبا من مقابلها الناتج من تلقيح ديوك من البلدى مع أمهات من نفس الأنواع مما يعث على احتمال وجود صفات مرتبطة بالجنس خاصة بهذه الظاهرة .

ثانيا - ظاهرة انخفاض الخصب في الجيل الاول الناتج من الخلط بالنسبة للأنواع المتبقية أو للجيل الثاني ليس لها تفسير لا احتمال وجود صعوبة في التلقيح بين الديوك والدجاج .

ثالثا - بعض الافراد الخليطة كان اعلى في نسبة الفقس عن الأنواع الأصلية . كما أن الأفراد الخليطة التي كانت أمهاتها من الرودايلند كانت أعلى في هذه الصفة من الأفراد الخليطة الناتجة من الديوك البلدى مع الأنواع الأخرى مما يعث على التفكير بأن نوع الوراثة المرتبطة بالجنس والتحسن الوراثي يمكن أن تكون من الأسباب الداعمة لهذه النتيجة .

رابعا - النفوق الجنيني كان أعلى مستوى في خلال الاسبوع الثالث من التفريخ في كل المجموعات كما اتجه الى الانخفاض في مجموعة الافراد الخليطة عن مجموعات الاباء .