

TERTIARY SEX RATIO WITHIN LITTER  
IN RABBITS.

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Tertiary sex ratio within litter was investigated in purebred and single crossbred litters produced by Bauscat, Giza White, White Flander and Baladi Red rabbits. Data were collected on 360 litters weaned during the period 1976/77 - 1978/79 at Dokki, Experimental Station of Animal Production Research Institute. The overall least squares mean of tertiary sex ratio, measured as the percent of males among all bunnies weaned per litter was 52.6%. Effects of breed group, age of doe, parity, month of kindling and year of kindling were nonsignificant. Tertiary sex ratio in the crossbred litters was always higher than in the purebred ones. It increased with advance of parity from the first to the fifth and decreased thereafter. It also increased with advance of month of year of kindling from (September-October) to (January-February) and decreased thereafter till (May-July).

Sex ratio is expressed as the number of males per hundred females or as the percent of males relative to all males and females. It is known as primary, secondary and tertiary sex ratio when considered at conception, birth and weaning or at any other age, respectively (Lush, 1960 & Nalbandov, 1970).

Sex ratio is assumed to be controlled through a balance between sex chromosomes and autosomes according to the theory of chromosomal type of sex determination (Nalbandov, 1970). It is held near equality in vertebrates (Lush, 1960 & Nalbandov, 1970). However, there exist a slight but consistent deviation from equality in that ratio. This maybe caused, as cited by Lush (1960) and Nalbandov (1970), by differences between X- & Y- chromosomes in motility or longevity, differential prenatal and immediate postnatal mortality, frequency of ejaculation, advance in parity and genetic selection.

Lush (1960) noted that various investigators found that differences in sex ratio were sometimes associated with season of the year, year-to-year differences and excessive sexual activity. Hafez (1963) reported that tertiary sex ratio is normally affected by genetic and environmental factors. Sandford (1979) noted that many factors appear to influence sex ratio and gave examples for the effects of numerous repeated matings at the same time by the same buck, crossbreeding, seasons and parity.

Tertiary sex ratio appears to be important in vital statistics where it is used to express the proportion of the two sexes when they reach procreative age. Information about tertiary sex ratio in rabbits is lacking. This study was carried out to investigate the tertiary sex ratio, measured within litters at weaning in rabbits and the role of some factors deemed to influence it under diallel crossing program.

#### Materials and Methods

Data of tertiary sex ratio, measured within litter at weaning, were collected over the period 1976/77 - 1978/79 on the rabbit flock raised at Dokki Experimental Station that belongs to Animal Production Research Institute, Ministry of Agriculture.

It comprised records on 360 weaned litters produced through a complete diallel crossing experiment using rabbits of Bauscat (B), Giza White (G), White Flander (F) and Baladi Red (R) breeds. The breeding plan permitted the production of litters of all possible pure-bred and F1 crossbred combinations between the four breeds in each parity. Bucks were always assigned at random to breeding females with the restriction to avoid full-sib and half-sib matings. Details of the breeding plan, feeding and managerial procedures were reported by Emara (1982) and Afifi and Emara (1986).

Statistical analysis was performed using the least squares procedures shown by Harvey (1960). A linear model including the fixed effects of breed group, age of doe, parity, month and year of kindling was adopted. Tests of significance for differences between means of the different levels of each factor were done according to Duncan (1955). Values of tertiary sex ratio, considered as the percent of males among weaned (at 5 weeks) bunnies per litter, were subjected to an arc-sin transformation before the statistical analysis to approximate normal distribution. Means presented in table 1 were obtained by the decoding from arc-sin to the original scale.

#### Results and Discussion

Tertiary sex ratio, averaged 52.6% (table 1). This estimate is higher than 49.7% for litters of Bauscat, Grey Giant Flander, Baladi White, Baladi Red and Giza White rabbits calculated by Kadry and Afifi (1982). It is lower than 53.8% estimated by the same authors for litters of Grey Giant Flander, Giza White rabbits and their two reciprocal crosses.

Table 1 : Least squares means<sup>+</sup> and tests of significance (F values) for factors affecting tertiary sex ratio (percent of males/litter at weaning at 5 weeks of age).

Classification	No	Mean ++ %	Classification	No	mean ++ %
<u>General mean :</u>	360	52.6	<u>Parity :</u>		(F value=1.237)ns
<u>Breed group :</u>		(F value=1330)ns	1st.	72	33.4 a
Bauscat	40	49.4 abc	2nd.	67	46.2 ac
Giza White	66	47.5 abc	3rd	46	48.0 ac
White Flander	14	55.1 abc	4th.	34	54.5 ac
Baladi Red	18	54.4 abc	5th.	40	67.7 bc
BG	35	49.5 abc	6th.	35	56.9 ac
GB	18	54.0 abc	7th.	26	51.8 ac
BF	10	70.0 a	8th and more	40	56.0 ac
FR	20	60.2 ab	<u>Month of Kindling:</u>		(F value=1.160)ns
BR	12	55.4 abc	Sept.-Oct.	10	41.7 a
RB	26	33.9 bcd	Nov.-Dec.	56	47.1 a
GF	14	56.0 ac	Jan.-Feb.	121	60.0 a
FG	27	47.3 ac	March-April	106	55.9 a
GR	10	53.7 ac	May-July	67	54.5 a
RG	30	30.0 c	<u>Year of Kindling:</u>		(F value=0.557)ns
FR	10	68.5 ad	1976/77	156	47.3 a
RF	10	55.0 ac	1977/78	150	52.7 a
<u>Age of doe :</u>		(F value=1240)ns	1978/79	54	55.5 a
6 - 12 months	78	66.9 a			
13 - 18 ..	89	61.9 ab			
19 - 24 ..	55	42.8 b			
25 - 30 ..	46	55.8 ab			
31 - 36 ..	53	41.7 ab			
37 and more ..	39	41.5 ab			

<sup>+</sup> Means of sex ratio (male%) were obtained by the retransformation from arc-sin to original scale.

<sup>++</sup> The appearance of the same litter with means within the same classification signifies that they do not differ significantly ( $p \leq 0.05$ ) otherwise they do.

n.s Not significant ( $P \leq 0.05$ ).

Tertiary sex ratio in the present work varied from 30.0 to 70.0% with breed group but without overall significant difference (table 1). In agreement with those findings Kadry and Afifi (1982) reported that breed group effects on male percent in bunnies weaned per litter were nonsignificant. In spite of that, the relative size of F values of all factors included in the model of analysis (table 1) indicate that breed group effects constituted the most important factor influencing tertiary sex ratio.

Means presented in table 1 show that most Bauscat crossbred combinations surpassed purebred Bauscat in tertiary sex ratio. The same observation was noticed when dealing with means of the crossbred and purebred combinations of Giza White, White Flander and Baladi Red rabbits. These results show that crossbreeding tended to increase tertiary sex ratio. The average of the means of all crossbred combinations and the mean of the purebreds of Bauscat (53.8 VS 49.4%), Giza White (48.4 VS 47.5%), White Flander (59.5 VS 55.1%) and Baladi Red (49.4 VS 45.4%) rabbits show the same trend. In this concern, Sandford (1979) noted that number of males maybe higher than females when two purebreeds were mated together.

Age of doe effects on tertiary sex ratio did not show any consistent trend. Tertiary sex ratio increased with advance of parity from the first to the fifth and decreased thereafter. Sandford (1979) showed that the proportion of males increased as the doe produced further litters. There was a general tendency for that trait to be low in early months of the year of kindling (September-October), to increase as months of year of kindling advanced till (January-February) and to decrease again up to the end of the year (May-July).

Age of doe, parity, month and year of kindling did not show significant contribution to the variance

of tertiary sex ratio in the present data. This is in complete agreement with findings of Kadry and Afifi (1982). Lush (1960) stated that various investigators found that differences in sex ratio were sometimes associated with race, season of the year, year-to-year differences.....etc, but non of these differences were large enough to be economically important.

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النسبة الجنسية الثالثه في البطن - عند الفطام - في الارانب

عزت عبيقى ومحمد الامين عمارة

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درست النسبه الجنسيه الثالثه في البطن - عند الفطام - في البطون النقيه والخليطه التى تم الحصول عليها من انواع اليوسكات والجيزه الابيض والفلاتدر الابيض والبلدى الاحمر وشملت الدراسه بيانات عن ٣٦٠ بطن فطمت خلال القتره من ١٩٧٧/٧٦م حتى ١٩٧٩ /٧٨ في محطه البحوث بالدقى التابعه لمعهد بحوث الانتاج الحيوانى - مركز البحوث الزراعيه كان المتوسط العام للنسبه الجنسيه الثالثه في البطن مقدرة كسبه مئويه للذكور من اجمالى الخلفه المفطومه ٥٢٦% . كانت تأثيرات المجموعه التربويه وعمر الام وترتيب الولاده وشهر وسنه الولاده غير معنويه . كانت النسبه المئويه في البطون الخليطه اعلى منها في البطون النقيه . كانت النسبه الجنسيه تزيد بتقدم ترتيب الولاده من الاولى حتى الخامسه ثم تقل بعد ذلك في الولادات التاليه وكانت تزيد ايضا . بتقدم شهر الولاده من بدايه موسم الانتاج (سبتمبر - اكتوبر ) حتى (يناير - فبراير ) ثم تقل بعد ذلك في الشهر التاليه حتى نهايه الموسم (مايو - يوليوسه) .