

THE WORLD'S POULTRY SCIENCE ASSOCIATION
(WORKING GROUP N. 8)
WATERFOWL

Dept of Anatomical
Physiological and Animal
Production Science
University of PISA - ITALY



Proceedings

**9th INTERNATIONAL
SYMPOSIUM
ON WATERFOWL**

PISA - ITALY

16-18 September 1992

REPEATABILITY OF THE SPERMATOZOA PRODUCTION IN MUSCOVY DUCK

Bagliacca M., Paci G., Marzoni M.

Department of Anatomical, Physiological and Animal
Production Science - Pisa University.
56100 PISA - ITALY

ABSTRACT

Quantity and concentration of sperm production is of fundamental importance for artificial insemination. The knowledge of the repeatability of these characters is useful as a preliminary trait for establishing programs of genetic and/or management improvement.

Seventeen Muscovy duck males of a local Italian variety were tested during the entire reproductive season. Repeatability of part record of sperm production was evaluated in different periods and correlation coefficients were calculated between periods within animals.

Results showed that repeatability is sufficiently high but correlation coefficients and Spearman rank correlation coefficients between part-records are quite low.

INTRODUCTION

Crossing of Muscovy drakes with common ducks of Pekin or other breeds is very useful to produce high meat quality birds but natural breeding often results in poor fertility. For this purpose the use of artificial insemination (AI) is important and spermatozoa production is of fundamental importance (2,4).

How spermatozoa production is measured determines what part of the genome of the duck is being considered. If spermatozoa production is measured from age at sexual maturity, the trait probably excludes many genes affecting sexual maturity. If only early sperm production (part record) is considered then genes responsible for persistency, that do not act on early production, are not included. Sperm production measured only during the last part of the reproductive season does not consider genes influencing early sperm production and age at sexual maturity, and so on. Thus, the definition of sperm production and how it must be measured in the genetic program are crucial to selection.

Since heritability of sperm production is a portion of repeatability of the character (heritability may be at the most the same of repeatability if phenotypic variance is equal to zero) It is interesting to evaluate the value of the differently measured repeatability of spermatozoa production of a local unselected Italian Muscovy duck variety measured in different periods.

MATERIALS AND METHODS

Seventeen Muscovy drakes of a local rustic Italian variety characterized by black phenotype (1) were examined during a period of 34 weeks. Semen was collected by means of an artificial vagina. Three parameters were used as indicators of the sperm production: sperm volume (SV), sperm concentration (SC) and sperm production per ejaculate (SPE). All the parameters were examined three times a week. The SV was measured directly during the collection into a gauged tube (the precision was .1 ml). The SC was determined by Bürker's technique (3). The SPE was calculated by the former parameters. Part sperm production was divided in the following three part-production periods:

RECORD	PERIOD	SEASON	RECORD LENGTH
Early part record	1	Feb-Apr	Housing to 53 weeks of age
Middle part record	2	May-Jul	About 54 - 66 weeks of age
Final part record	3	Aug-Sep	About 67 - 75 weeks of age
Whole record	4	Feb-Sep	Housing to 75 weeks of age

Repeatability was calculated by the analysis of the variance within drakes within sub-periods; correlations between periods were calculated by regression within drakes between periods.

RESULTS AND DISCUSSION

The average SV, SC and SPE of the tested population were $.79 \pm .31$ ml, $2.08 \times 10^9 \pm 1.4 \times 10^9 / \text{mm}^3$ and $1.6 \times 10^9 \pm .8 \times 10^9$, respectively.

The values of repeatability of the characters, Pearson and rank correlation coefficients are shown in table n. 1, 2 and 3, respectively.

Table n. 1 - Repeatability of different measures estimating sperm production

	Period 1	period 2	period 3
SV.....R ²	.816	.317	.537
SC....."	.562	.895	.917
SPE....."	.528	.805	.734

Repeatability was generally high for every parameter in each period except for SV tested in the second part of the reproductive season. A reduction of repeatability of SV was in any case compensated by the increase of repeatability of SC and SPE.

The part-part correlations showed a not close relationship between the characteristic of each period in particular the relationship between the early period and the final period of sperm production resulted very fade. Rank correlation coefficients showed that a drake classified to the first place for SV

SC or SPE is overtaken by other males in most of cases. Part-whole correlations showed a sufficient relationship and only early part records with whole records were inadequate.

Table n. 2 - Correlation coefficients among periods of sperm production (part-part correlations and part-whole correlations).

	SV	SC	SPE
Period 1 with 2....r	.429	.623	.734
Period 1 with 3...."	.062	.231	.427
Period 2 with 3...."	.654	.766	.777
Period 1 with 4...."	.531	.848	.850
Period 2 with 4...."	.866	.918	.964
Period 3 with 4...."	.859	.693	.758

Table n. 3 - Spearman rank correlation coefficients among periods of sperm production (part-part correlations and part-whole correlations)

	SV	SC	SPE
Period 1 with 2....r	.216	.643	.857
Period 1 with 3...."	.003	.214	.357
Period 2 with 3...."	.775	.679	.714
Period 1 with 4...."	.321	.893	.929
Period 2 with 4...."	.955	.857	.964
Period 3 with 4...."	.857	.536	.607

Summarizing, repeatability was sufficiently high to induce to evaluate heritability of part records but correlation coefficients and rank correlation coefficients between part-records were quite low and genetic correlations must be evaluated before choosing the parameter to be measured for selection.

REFERENCES

- 1- Avanzi C.F. and Crawford R.D.(1990) - Chapter 17. Mutations and major variants in Muscovy ducks. Poultry Breeding and Genetics (R.D.Crawford Editor):389-394.
- 2- Bagliacca et Al. (1989) Egg-fertility of Muscovy duck, game farm mallard and their interspecific crossbreeds. Proc. 8^o Int. Symp. of Waterfowl, Budapest:109-111.
- 3- Marzoni M. et Al. (1991) - Methods to estimate Muscovy drake spermatozoa concentration. Ann.Fac.Med.Vet.XIX: .
- 4- Pingel H. (1990) - Chapter 31. Genetics of egg production and reproduction in waterfowl. Poultry Breeding and Genetics (R.D.Crawford Editor): 771 -780.