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A.I. IN RABBIT BREEDING. NOTE 2: EVALUATION OF MALE SUITABILITY IN A PROGRAM OF ARTIFICIAL INSEMINATION FOR COMMERCIAL RABBITRIES.

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INTRODUCTION

The A.I. field utilization in rabbit breeding is a quite new practice in Italy /Costantini 1986/, /Bonanno and Costanzo 1987/, and still now the breeders do not ask for semen of bucks with a better breeding value, rather they want to improve the herd management, i.e. to synchronize the deliveries, to lower the labour etc. Another strong reason which induces the breeders to utilize the A.I. is the great difficulty to perform the natural insemination in summertime /Sittmann et al. 1964/, /Bagliacca et al 1987/, /Valentini et al 1987/.

As a consequence of this preference, the semen drawing Center was induced, in a first attempt, to skip the genetic estimation and to focus the interest on the evaluation of some morphological and functional characters, like semen quality, fertility rate and litter size /Facchin et al. 1988/.

Since the practice of A.I. is widespreading, the breeders can be induced to return more data, allowing the Center to perform a genetic evaluation of bucks in order to improve the efficency of the service.

The aim of the research is to study how is possible to classify the males for the over mentioned characters taking into account some variability sources in order to get unbiased estimates.

MATERIALS AND METHODS

The Center has been in activity for two years, working in about 30 farms, utilizing 103 males belonging to various breeds and coming from different sources. The subjects have been housed in a standard building with static ventilation and only during the moulting a vitamin treatment was added to a standard commercial feeding.

The ambient temperature was uncontrolled and ranged from 5 to 32 degrees. The bucks were carefully controlled and part of them was culled for sanitary reasons, mainly for podalic sores and pasteurellosis. Then the remainders were checked for mating

suitability; the considered parameters were the libido, the semen quality (i.e. ejaculate volume, colour, density and spermatozoa motility) /Sinkovics 1987/ and the number of doses produced per time unit.

Once the parameters were found acceptable, the semen of the selected males began to be utilized at random among the herds. However if the mean fertility rate, after few inseminations, appeared to lay below 60% or the mean litter size below 6, then the subjects were culled.

The males with at least two seasons of activity were evaluated taking into consideration the two main sources of variability, as to say season and herd, adopting the model:

$$Y_{ijkl} = \mu + \alpha_i + \beta_j + s_k + (\beta s)_{jk} + \epsilon_{ijkl}$$

where
Y = registered character
μ = overall mean
α = herd
β = season
s = subject

Since the herd and subjects number was quite limited, there was no need to absorb any effect and the least square estimates were directly computed, with the advantage of obtaining indeed an evaluation of single farm. It was possible, therefore, to inform the breeder when the lower productivity results were not to be imputed to the bucks, rather to the poor quality of the farm environment and/or management.

The error distribution, tested by a probability plot /Gnanadesikan 1977/, did not appeared to be far from the normal one, so that there was no need to make transformations or to choose other estimation methods. The data available allowed to rank 20 males with a total of 125 A.I. intervention in 15 herds. The inseminated does were 12830.

It must be noted that the statistical analysis was performed on ratios, hence the estimated means refer to the probability to find such ratio in a level of an effect (i.e. herd, season and subject) and they can differ from the means obtained by dividing the summed numerators and denominators.

RESULTS AND DISCUSSION

About one third of the 103 males utilized was culled before to enter in the A.I program for sanitary or semen quality reasons (Fig. 1).

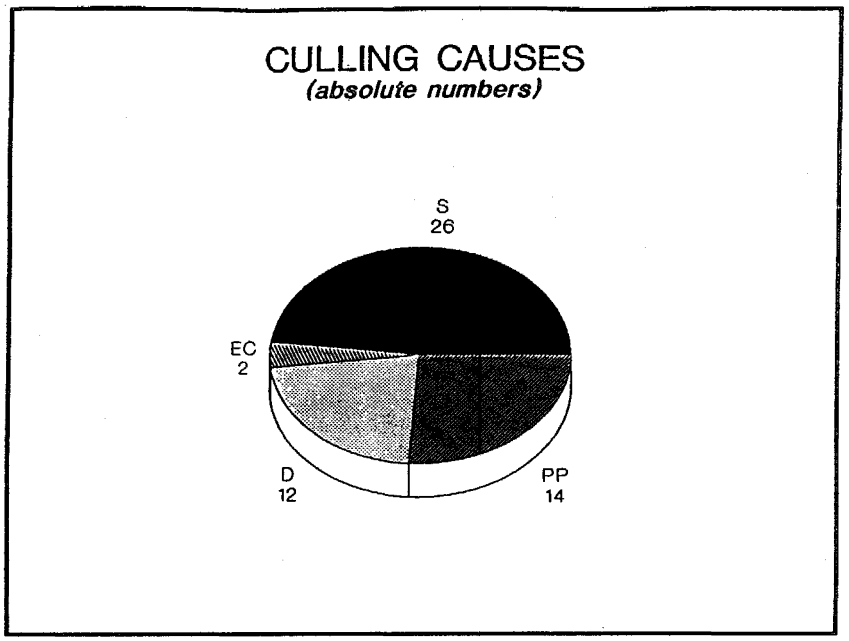

Fig.1. Number of males culled from the beginning of the A.I. program. S = after sanitary and semen quality control, PP = for poor performances, D = for death or illness, EC = for end of career.

About one other third is lost during the reproductive career, but it must be considered that 26 of the remainders, i.e. more than 50%, is still under test, therefore large part of them is likely to be culled.

The ANOVA model utilized explained 95% of the variance of the fertility rate, while only the 55.5% of the litter size, but it must be considered that not all the breeders return this datum to the Center. The effects of the factors male and herd in fertility rate were significant ($P<0.01$), while the season effect did not. None effect was found significant for litter size. In Tab. 1 the estimated means for each subject are showed. In the last two columns the ranks for fertility rate and litter size are reported .

BUCK	FERT RATE	LITTER SIZE	BUCK'S RANKS FERT	LIT.SIZE
1	64.5	6.7	5	7
2	74.6	7.1	2	3
3	64.8	6.6	4	9
4	72.5	6.2	3	15
5	54.5	6.9	12	6
6	54.8	6.9	10	5
7	53.0	6.6	13	11
8	50.1	7.2	15	2
9	51.1	6.7	14	8
10	54.6	7.4	11	1
11	60.8	6.5	7	14
12	63.4	6.2	6	16
13	57.8	6.6	8	10
14	57.5	6.9	9	4
15	47.4	5.2	16	19
16	18.0	4.8	20	20
17	77.1	5.9	1	18
18	46.4	6.0	17	17
19	30.2	6.6	19	13
20	43.5	6.6	18	12

Tab. 1. Estimated means for each subject. The significance between the males is not reported because the huge number of the possible comparisons.

The estimated means largely differ from the directly computed ones because the strong effect of the herd factor.
In Tab.2 are reported the season estimated means.

SEASON	FERT.RATE	LITTER SIZE
WINTER (dec..feb)	66.1	6.7
SPRING (mar..may)	56.3	6.3
SUMMER (jun..aug)	51.7	6.8
AUTUMN (sep..nov)	57.3	6.6

Tab.2. Estimated means for the season effect.

Although the Summer mean fertility rate is the lower, the difference does not reach a significant level. The interactions between male and season are not significant too. This result is strongly in favour of the utilization of A.I. in summertime, taking into account that the fertility rate refers to all does submitted to the insemination independently from their pseudo-oestral status. Utilizing the N.I., instead, more does are submitted to the mating and the fertility rate is computed only on those which really accepted the service.

It must be noted that during the summer it was utilized the semen of those males not depressed by the hot temperature and with still good spermatozoa motility.

The lack of significance for the male-season interaction induce to direct a (phenotipical) selection based only on the results obtained by the bucks on a suitable number of herds in whichever season.

Since one of the aims of the Center is to share technical assistance between the rabbit farms, it is of interest to take also into account the herd estimated means. These means are a part from subject or seasonal effect and they show strong differences between the herds. The differences, or the deviations from the overall mean, can be used to induce the breeder to improve the herd management and to reach the level of the best breeders in his region.

CONCLUSIONS

The methodology proposed for testing the suitability of males to be introduced in a A.I. program appears, after two years of activity in several rabbitries, to fit adequately the breeders requirements. In particuliar the A.I. is confirmed to not lower the fertility rate during summertime. The estimated means for the parameters taken into account are unbiased under the operative conditions. Those means consent to perform a phenotypical selection of the bucks and to better distinguish the causes of a herd low productivity.

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SUMMARY

One of the major reasons which induces private breeders to utilize a service of A.I. in Italy is the uniformity in fertility rate and in litter size even during unfavorable seasons. Thus it is of primary interest to test the males for these characters before attempting to evaluate their breeding values. About 100 males have been tested for 22 months. After a preliminary culling for sanitary reasons, the males were controlled for semen quality. Then the bucks began to work at random among the herds. Data on fertility rate and litter size were collected and an evaluation continuously revised was made using a linear model taking into account the season and herd effects. Differently from N.I., the season does not seems to strongly affect the male performances, while there are large variations among the herds. The results of the analysis are currently utilized both to select the males and to teach the breeders.

VALUTAZIONE DELLA ATTITUDINE DEI MASCHI AD ESSERE INSERITI IN UN PROGRAMMA DI F.A. PER GLI ALLEVAMENTI DI CONIGLI DA CARNE.

RIASSUNTO

Uno dei motivi principali che spingono gli allevatori di conigli in Italia ad utilizzare un servizio di F.A. è l'uniformità nella fertilità e nel numero di nati anche in stagioni sfavorevoli. Di conseguenza è di primario interesse controllare i maschi per queste caratteristiche prima di valutare il loro valore genetico. Durante 22 mesi sono stati testati circa 100 maschi. Dopo una preliminare eliminazione per ragioni sanitarie, i maschi venivano controllati per la qualità del seme. In seguito il loro seme era utilizzato casualmente presso gli allevamenti e i dati riguardanti le relative fertilità ed il numero di nati erano analizzati tramite un modello lineare che teneva conto degli effetti stagione ed allevamento. A differenza della inseminazione naturale, la stagione non è risultata influire in modo significativo con le performances dei maschi, mentre si sono manifestate forti differenze tra allevamenti. I risultati dell'analisi sono attualmente utilizzati sia per selezionare i maschi che quale strumento didattico per gli allevatori.