WORKING TIMES IN RABBIT PRODUCTION SYSTEM WITH BATCH

KOEHL P.F., MIRABITO L.

Institut Technique de l'Aviculture, 28 rue du rocher, 75008 Paris, France.

Abstract - A study was realised in 1994, in order to measure the working time in 41 rabbit's units managed with batches.Five types of way of management were analysed : Single batch with cycle 35 days (N=8) and cycle 42 days (N=7), two batches with cycle 42 days (N=6) and three batches with cycle 42 days (N=13) and one, in individual management (N=7).
The working time in single batch, with cycle 42 days is significantly inferior (4.06 h ± 0.34 h per female per year) to these of the other ways of management (5.45 h ± 0.58 h to 6.41h ± 0.51 h per female per year).
These results would be confirm if the working time is calculated per produced rabbit.

INTRODUCTION

For a few years, a new practice has been developed in rabbit production units : production system with batch. The control of artificial insemination and other factors explain this phenomenon. Itavi realised a survey on this subject in 1994 in order to measure the impact of this technical on the working times.

MATERIALS AND METHODS

The sample is constituted of 41 rearing units (figure 1).

Figure 1 : Sample's constitution

Way of Management	Theorical interval between 2 matings of the same female (day)	Interval between 2 matings operations (day)	Number of simultaneous batches	Number of rearing units	Average size of the units
42/1	42	42	1	7	305
42/2	42	21	2	6	439
42/3	42	14	3	13	365
35/1	35	35	1	8	302
Individual Management (IM)	variable	<=7	-	7	273

Type of works has been divided in two groups :
- occasional works (less than eight times a year) which have been estimated with the producer when we presented to him the records forms
- routine works that have been noted by the breeder during the cycle (42 days for the mode 42 and IM, 35 days for the mode 35/1). In the case of artificial insemination, the additional working force times has been counted.

The major variables are :
   - Routine working times by cycle and female
   - Annual routine working times by female defined as Routine working times by cycle and female multiplied by 52 and divided by the duration of the cycle in weeks
   - Total annual working times (routine + occasional) by female is the previous variable plus the total annual occasional working time by female
   - Total annual working times (routine + occasional) by produced rabbit
In fact, we assume the hypothesis that the measure obtained from a single cycle is a good approximation, i. e. the working time is not cycle dependant. In fact, data obtained from the 42/2 and 42/3 ways of management show strong relation between the working times of two successive batches in the same rearing unit. So, we think that there is no objective reason for differences in the case of the other modes.
The data has been processed by variance analysis considering the factors with fixed effect « way of management ». Average comparisons have been realised with Student Newman Koeuls test and the risk was fixed to 5% (SAS 6.03 Proc GLM). In the figures, two different letters show a significant difference within risk

of 5% and SEM means Standard Error of the Mean. Regression analyses have been done with Proc REG SAS 6.03 (the model will be specified later).

RESULTS AND DISCUSSION

The way of management has a significant impact on the routine working time by cycle (Pr<0.0065). The mode 42/1 is opposed to the 42/2, 42/3 and IM. The mode 35/1 is in the middle and not significantly different from all the others (figure 2).

Figure 2 : Routine working times per cycle and per female

Management	Number of observations	Time (hour)	SEM
42/1	7	0.43 a	0.04
35/1	8	0.53 ab	0.02
42/2	6	0.59 b	0.06
42/3	13	0.62 b	0.06
IM	7	0.68 b	0.06

F=4.24   Pr>F 0.0065

For a year, this impact (routine and totals) is persisting (Pr<0.0090 and Pr <0.0063). In this case, the 42/1 is clearly opposed to all the others (figure 3).

These results point out 2 aspects
- Routine working times and total working times hierarchies are similar, so we can suppose that the occasional working times are the similar, despite different ways of management (general average : 0.37 hours/female/year).

Figure 3 : Annual working times per female

Management	Number of observations	Routine time (hour)	SEM	Total time (hour)	SEM
42/1	7	3.73 a	0.30	4.06 a	0.34
35/1	8	5.49 b	0.25	5.79 b	0.25
42/2	6	5.11 b	0.53	5.45 b	0.58
42/3	13	5.40 b	0.34	5.77 b	0.33
IM	7	5.91 b	0.52	6.41 b	0.51

Routine time : F=3.98   Pr>F 0.0090
Total time : F=4.26   Pr>F0.0063

- The increasing of the time for 35/1 can be explained by a mechanical effect connected with the number of cycles during the year (10.43 against 8.69 for the 42/1 mode).

Because of this last reason, it seems necessary to weight these results by the expected productivity (figure 4).

The total annual working time analysis by produced rabbit shows again a significant effect of the way of management (Pr< 0.0045). A produced rabbit with a 42/1 type management needs significantly less time than one produced with any other mode with the same rhythm, i.e. 42 days. The single batch management during 35 days shows an intermediate result.

These different results show that it is possible to identify two main groups : the single batch managed units and the others which obtain similar average results. The time's differences per female are made up by the productivity's gap (it would have been interesting to have units managed with 42/2 mode and artificial insemination to refine this issue, which should be limited to the units natural managed reproduction).

Figure 4 : Annual working times per produced rabbit

Management	Number of observations	Times (hour)	SEM	Number of produced rabbit/female/year
42/1	7	0.08 a	0.01	51.8
35/1	8	0.10 ab	0.01	58.3
42/2	6	0.13 b	0.02	44.9
42/3	13	0.12 b	0.01	47.8
IM	7	0.13 b	0.01	51.2

F=4.54   Pr>F 0.0045

The 42/1 way of management is clearly different and allows a working time's reduction, with any criterion observed. The medium result obtained by the 35/1 mode can be explained by the conjugated effects of a cycle working time superior to the one of the 42/1 mode and an observed productivity, lower than forecasted, in relation with the number of cycles (+13% instead of + 20% expected). The limited sample's size

does not permit us to explain more precisely the observed differences between the two ways of management (technical means employed, material, etc...).

However, it is impossible to generalize the results of working time per produced rabbit. The average productivity of the rearing units in the mode 42/1 seems, in fact, clearly superior to the published results (Club Rablo, 1995) and so, to the first data obtained by ITAVI (not published). In the first case, there is 44.8 rabbits produced per present female and per year and, in the second, 46.9 per mated female and per year, i. e. 5 to 6 rabbits less than in our sample.

In a second time, we have also studied the qualitative differences between the production systems. In this aim, we have determined the minimal number of days that represents 50% of the working time by cycle. This allows us to point out eventual working picks (figure 5). There is a clear difference between the 42/1 way of management and the others «42 days» modes. The difference between the 35/1 and 42/2 is just on the hedge of the significance level (Pr<0.0581).

Figure 5 : Minimal number of days representing 50% of the working time (Wilcoxon's test between 2 averages)

Management	Number of observations	Number of days	SEM
42/1	7	6.6 a	0.5
35/1	8	7.4 ab	0.5
42/2	6	10.5 bc	1.3
42/3	13	10.6 c	0.7
IM	7	12.7 c	0.9

These results prove a clear concentration of work in the case of single batch management : 50% of work is concentrated on 15.6% of the total time of the cycle against 27% for the other 42 days modes. With the 35/1 way of management, if the working picks are similar to the 42/1, their relative part increases in proportion with the reduction of the cycle's duration. These working picks are in relation with the main rearing operations (mating, deliveries, weaning, sale, cleaning, transferring females and installing nest).

For this reason, in a third time, we searched for the way of management 42/1 and 35/1, the causes of variability of time between the units and tested some models. Because it takes seven days to complete the main cycle's operation, the variability of the total time could be explained by the time's gap during these seven days. A second component of this variability could be constituted with the total number of action made during the cycle which recover a quantitative aspect (proportional time for number of act) and a qualitative aspect (meticulousness, organisation).

Whatever the way of management, there is a significant correlation between the working time by female during 7 days and the working time during the cycle (figure 6). Regression between the number of acts and the total time per cycle seems to be a non linear function. So we did not make more analyses.

The forecast equations with the variable « time for 7 days » are the followings :

Way of Management	INTERCEPT estimate	INTERCEPT test e=0	TIME FOR 7 DAYS test e=0	TIME FOR 7 DAYS estimate
35/1	0.22	0.0710	1.23	0.0178
42/1	0.06	0.6633	1.69	0.0248

In first sight, it emerges that this variable has an effect on the result's variability but it must be confirmed with more important sample.

Nevertheless, as the measure of the working time on these 7 days is probably more precise (easier to realise) than the measure on the whole cycle, it appears that getting a reliable prediction model would allow, by limiting the number of records, numerous farmers to get an estimation of their productivity by hour.

Figure 6 : Regression analysis between the working time by female during 7 days and the working time during the cycle

Way of Management	R-SQUARE	Pr>|T|
42/1	0.6015	0.0248
35/1	0.5750	0.0178

CONCLUSION

In 1987, the observed times in IM were 9.8 hour per female per year (KOEHL, DEVELTER). In 1994, these are only 6.4 hours.

The way of management with single batch and artificial insemination decreases (25% to 35%) the working time per female with regard to the other ways of management. However, our estimation is superior to the other source data (4.06 hour per female per year compared to 3 hours DESSEVRES 1993)
The estimation of working time per produced rabbit has to be confirmed. Due to the lack of reliable references upon average productivity in units managed with batch, we were not able to qualify our sample in relation with productivity. It will be possible when the references centralised by ITAVI will be available.

REFERENCES

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Résumé - Une enquête a été menée en 1994, pour mesurer les temps de travaux dans 41 élevages cunicoles conduits en bandes. 5 types de conduite ont été analysés : bande unique à 35 jours (N=8) et 42 jours (N=7), deux bandes à 42 jours (N=6), trois bandes à 42 jours (N=13) et la conduite individuelle (N=7).
Le temps de travail du mode de conduite en bande unique à 42 jours est significativement inférieur (4.06 h ± 0.34 h par femelle et par an) aux temps des autres modes de conduite (5.45 h ± 0.58 h à 6.41h ± 0.51h par femelle et par an).
Il reste à confirmer ce résultat si on ramène le temps de travail au lapin produit.