

**EFFECT OF PRE-WEANING HANDLING ON POST-WEANING  
MORTALITY FOLLOWING DIGESTIVE DISORDERS IN THE RABBIT**

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"Specialists" do not speak of the rabbit without referring to its particular psychism : it is very often described as a timorous and fearful animal, which is very sensitive on stress and therefore difficult to breed. The breeder himself, owing to his behavior and the quality of his know-how in breeding is a potential cause more or less important of stress for the animals : this reality is more often lived in an empirical way and it has been possible for us to study it in a more rational way in our experimental breeding.

The idea of the following trial comes from the observation made during the different experiments carried out in the rabbit breeding of our experimental station. Before presenting it, it is not unuseful to remind you of the experimental standard subject followed for our nutritional trials on fattening rabbits : weaned between 28 and 31 days of age, young rabbits are separated from their mother ; they are weighed according to their litter and then individually numbered, sexed and identified thanks to a metal ring placed on the ear. They are then divided into homogenous lots according to their original litter, their weight and their sex, in front of the different experimental feeds.

At the end, when the trial only deals with the fattening period (from the weaning to the slaughter), the division into weaning lots is the first intervention of the experimenter on the animals and constitutes their first handling.

On the other hand, it is not the case when a maternity trial is carried out before a fattening trial. In this case, the young rabbits are handled as soon as they are born and then many times until the weaning (daily weighing at 1, 7, 14, 21 and 28 days of age)

Hence, during a long period, superior to one year, we have noticed that these handlings were not "neutral", we have stated that the post-weaning mortality rate in fattening (apart from the feeding diet effect) was systematically weaker for the young rabbits which were previously submitted to a maternity trial : for 6 trials, this rate ranges from 1,4 % against 7 % for the young rabbit of the 5 trials for which no handling was made in maternity (see table 1). Following to this observation, from which no conclusion can be formulated because it doesn't come from simultaneous experiments, we have reaseonned as follows :

During the weaning, the handling causes a stress for the rabbit, which added to the one caused by the separation from the mother and the one of the feeding diet changes can be responsible for digestive disorders said "adaptation" and often mortal for the post-weaning period.

Besides, works carried out by specialists on laboratory animals, pets or breeding animals confirm that animals have aversion to human being (fear, immobilization, aggressiveness) which show a stress state. The same works have therefore shown that the early handling of the young animals before weaning could reduce its emotional potential in front of human beings and its sensibility on stress and so could have an influence on the development of its cerebral and endocrinal system in particular on the adrenal cortex axe. It has been studied for the rat (Archer, 1973, Wiener and Levine, 1983 ; Wilson and Al, 1986 and Meinraht and Flaherty, 1987) but also for the rabbit ; Anderson and Al (1972), Denenberg and Al (1973), Wyly and Al (1975) have shown that handled rabbits had before weaning an exploratory behaviour and a more intensive activity when adults than not handled young rabbits. The results observed by Kersten and Al (1989), also show that handled rabbits before weaning are more "daring" and less "fearful" in front of human beings.

Furthermore, just as for the rat, the early handling of the young rabbit has an effect on its cerebral development because as Denenberg (1981) proved it, it helps the development of the interhemispherical communication.

At last, most of the behaviour specialists think that there is a critical period during which the animal is more sensitive on humane handling whose effects are then more important. For the rabbit, this period would correspond to 10 and 20 days of age (Kersten and Al. 1989 ; Wyly and Al. 1975) the results obtained for the 1-10 days of age period being less convincing because they are positive according to some authors (Wyly and Al. 1975), and negative according to the other ones (Metz. 1983 ; Kersten. 1985).

Besides, it is inside this period, between 17 to 20 days of age, that the young rabbit begins to become more independant and discovers his outside environment (get out of the nest box). This period corresponds also to a physiological weaning (passing from a milky feeding to a solid feeding).

If the young rabbit is submitted during this precise period to the experimenter's handling (weighing, sexing and ringing) which it usually lived during the weaning, its first relationship with the human being could be better.

In this hypothesis, the weaning stress would be lower and logically a cut down of the losses caused by post weaning digestive troubles could be observed.

## II - MATERIAL AND METHOD

To check this hypothesis, we have prepared the following experiment :

We have used for our trial young rabbits coming from 201 litters having hybrid mothers of Hyplus strain.

Between 17 and 20 days of age, a first handling is carried out (weighing sexing and ringing) on one young rabbit out of 2 among each litter. These rabbits make up the group of "before weaning handled rabbits". The handling lasts from 4 to 6 minutes for each litter. The other half of rabbits makes up the control group. In that way, the litter effect is cancelled.

Between 28 and 31 days of age, during the weaning, the young rabbits of the "before weaning handled rabbits" are once more weighed. The other rabbits are weighed, sexed, ringed and submitted then to their first handling by the experimenter. They make up the group of the "before weaning non handled rabbits" or control group as mentioned above.

The mortality rate and the growth of the animals have been measured for each fattening group.

The trial has been renewed 4 times and has been carried out on 1256 rabbits (627 for the control group and 629 for the experimental group).

In maternity just as in fattening, the animals are placed in wire cages (flat-deck type). Mothers cages are equipped with wood nest boxes with closed sides. In fattening, there are 8 rabbits per cage, which means a breeding density of 22.8 rabbits per sqm of wire.

In maternity, animals are fed ad lib with a complete feed containing 18 % of proteins and 14 % of crude fibre. In fattening, rabbits are fed ad lib with a feed containing 16 % of proteins and 15 % of crude fibre. The statistical analysis of the results has been made thanks to the SPSSPC+. The chi-carre test was used to analyze the mortality rate. For the zootechnical performances, we have used the variance analysis (with the study of repetition effects and feed).

### III - RESULTS

#### 3.1. Mortality rate during fattening (see table 2).

All the losses registred during the trial have been caused by digestive troubles.

The repetition results analysis shows that :

- for 2 out of 4 repetitions, the mortality rate of the lot "handled rabbits" is significantly lower than the one of the lot "control rabbits" : 10 % versus 4,37 % for trial n 1 and 6,92 % versus 3,11 % for trial n 3.
- For the 2 other repetitions, there is no significant difference between the 2 lots : 4 % versus 3,35 % for trial n 2 and 3,70 % versus 3,10 % for trial n 4.

The mortality rate for control rabbits varies therefore between 3,70 % and 10 % while the one of the experimental rabbits is more stable and ranges between 3,10 % and 4,37 %.

On the pooling of the 4 trials results, the mortality rate caused by diarrhoea in the lot "handled rabbits" is significantly lower compared to the one of not handled rabbits" lot : 22 animals out of 629 (3,50 %) died owing to diarrhoea for the experimental lot, against 39 out of 627 rabbits (6,22 %) for the control lot.

### 3.2. Zootechnical performances (see table 3)

The results which were obtained show that :

- There is no significant difference between the 2 treatments for the weaning weights ;
- The growth of the 2 experimental lots was the same and this, whatever the breeding period was.

There is then no effect of the treatment before weaning, on the post weaning growth performances of the young rabbits.

## IV - DISCUSSION - CONCLUSION

The hypothesis we made is confirmed because taken as a whole, the mortality rate of the handled animals caused by digestive disorders is almost twice lower than the mortality rate of the non handled rabbits, and this even if the response to the handling of the young rabbits changes according to the considered trial. It is to be noticed that the handling effect is clearly observed for the 2 trials for which the mortality rate is above 6 %. On the contrary, this effect doesn't appear when the mortality rate of the control group is lower or equal to 4 %. This suggests the possible existence of a limit for the mortality rate under which the effect of the handling can not appear, limit which is not controlled by the experimenter and which we could estimate around 4 %.

Besides, the effects of the young rabbit handling before weaning were until then studied from a behaviour specialist's point of view : the works carried out have shown that this handling allows to cut down the emotional state and the sensitivity to stress of the growing animal or adult. This leads also to an increase in their activity and in their exploratory behaviour (Anderson & Al. 1972 ; Denenberg & Al. 1973 ; Wylly and Al. 1975 ; Kersten and Al. 1989) and a decrease in the fear behaviour (immobilization reaction) in front of humane beings. (Kersten & Al. 1989).

Our work carried out under favourable environmental conditions (mortality rate between 1 % and 7 %) brings a new element which corresponds to the results obtained by the behaviour specialists : cut down of the mortality rate due to digestive troubles during the post weaning period obtained by young rabbit handling during pre-weaning is likely to prove that the animal is less afraid by humane beings. Furthermore, it could also be a decrease in the sensitivity to stress in general.

It also shows that the period of 17-20 days of age is a period during which the young rabbit is sensitive to human handling : this results must be similar to those of Kersten and Al. 1989 for whom the period of 10-20 days of age would be the most sensitive. It corresponds besides to an important development of the motor and sensorial system of the young rabbit (Hudson & Dustel. 1982).

Moreover, in the preliminary results which we have observed (see table 1), the margin of the mortality rate between handled and non handled rabbits is more important than the one registered during the experimentation itself : 5,6 points against 2,7 points. The young rabbits of the preliminary studies were handled as soon as they are born until the weaning (5 times as a whole ; at 1, 7, 14, 21 and 28 or 31 days of age), while the young rabbit of our experiment were only handled only at 17 days of age (twice between 17 and 20 days of age and the weaning). This suggests the possible existence of a cumulative effect of the handling, according to Wyly and Al. (1975), and that would be worth being confirmed by an other work.

On the other hand, it would be interesting to carry out this trial under breeding field trial for which mortality caused by digestive disorders is more important. It is besides not sure that less favourable hygienic conditions could give such results, because in front of several pathogenic agents, the handling effect would be doubled with a "contamination" effect.

At last, from a practical point of view, our work seems to prove that if breeding conditions are healthy, time spent by a rabbit breeder for maternity care leading to an handling of the rabbit, is no wasted time, because it is likely to reduce losses during fattening. This hypothesis does not correspond to the idea of a great number of breeders according to whom the handling of young rabbits is harmful for them.

## SUMMARY

Hybrid rabbits (n = 1256, Hyplus Strain) from 201 litters were individually handled (weighed, identified and divided according to the sex) or not handled before weaning between 17 and 20 days of life.

This handling, which has been carried out under healthy conditions, had a significant effect on post-weaning mortality following digestive disorders : 3.50 % for the 627 rabbits handled before weaning against 6.22 % for the 629 rabbits not handled rabbits before weaning.

On the other hand, handling had no effect on growing performances of the rabbits during the post-weaning period (30 to 73 days of life).

These results are complementary to the studies carried out by the specialists of ethology, which show that early handling of the young rabbit, especially between 10 and 20 days of age, reduces the stress sensibility, the emotionality and the fear of human beings. They suggest that stress which affect breeding rabbits is in part responsible for losses following digestive disorders during the post-weaning period.

## REFERENCES

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- Archer J., 1973. Tests for emotionality in rats and mice : A review *Anim. Behav.*, 21, 205-235
- Anderson, C.O. Denenberg, V.H. and Zarrow, M.X, 1972. Effects of handling and social isolation upon the rabbit 's behaviour. *Behaviour*, 43, 165-175.
- Denenberg, V.H., Wyly, M.V., Burns, J.K. and Zarrow, M.X.,1973. behavioral effects of handling rabbits in infancy. *Physiol. Behav.*, 10, 1001-1004
- Denenberg, V.H. Zeidner, L., Rosen, G.D., Hofmann, M., Garbanati, J.A. Sherman, G.F. and Yutzey, D.A., 1981. Stimulation in infancy facilitates interhemispheric communication in the rabbit. *Dev. Brain Res.*, 1, 165-169.
- Hudson R. and Distel, H.,1982. The pattern of behaviour of rabbit pups in the nest. *Behaviour*, 79, 255-271.
- Kersten, A.M.P., Meijsser F.M and Metz J.H.M. 1989. Effect of early handling on later openfield behaviour in rabbits. *Appl. Anim. Behav* 24, 157,167.
- Kersten, A.M.P. 1986. De invloed van het hanteren van zuigelingkonijnen op hun latere gedrag (samenvatting voordracht). *Lutra*, 29, 340-342.
- Meinrath. A.B. and Flaherty, C.F., 1987. Preweanling handling influences open-field behavior, but not negative contrast or sucrose neophobia. *Anim.Learn. Behav.*, 15, 83-92.
- Metz, J.H.M., 1983. Beïnvloeding van het gedrag van volwassen konijnen door hanteren tijdens de zoogperiode. *Biotechniek*, 22, 7-10.
- Wiener, S.G. and Levine, S., 1983. Influence of perinatal malnutrition and early handling on the pituitary-adrenal response to noxious stimuli in adult rats. *Physiol. Behav.*, 31, 285-291.
- Wilson. D.A., Willner, J.,Kurtz, E.M. and Nadel, L.,1986. Early handling increases hippocampal long-term potentiation in young rats. *Behav. Brain Res.*, 21, 223-227.
- Wyly, M.V., Denenberg, V.H. DeSantis, D.Burns, J.K. and Zarrow. M.X.,1975. Handling rabbits in infancy; In search of a critical period. *Dev. Psychobiol.*, 8, 179-186.

**Table 1 : MORTALITY RATE OF FATTENING RABBITS IN DIFFERENT TRIALS CARRIED OUT AT THE EXPERIMENTAL STATION AND FOLLOWED OR NOT BY MATERNITY TRIAL**

Fattening rabbit trial (chronological order)	Starting number	Mortality rate	
		Trials not followed by a maternity trial	Trials followed by a maternity trial
N 1	196	7.1 %	-
N 2	352	11.6 %	-
N 3	224	-	2.2 %
N 4	280	5.7 %	-
N 5	352	4.8 %	-
N 6	231	-	3.0 %
N 7	312	-	1.0 %
N 8	224	-	0.9 %
N 9	456	-	0.7 %
N 10	224	4.5 %	-
N 11	240	-	1.3 %
Cumulative trials n 1, 2, 4, 5, 10	1404	7.0 %	-
Cumulative trials n 3, 6, 7, 8, 9, 11	1687	-	1.4 %

**Table 2 : MORTALITY RATE OF FATTENING RABBITS (LOSSES CAUSED BY DIGESTIVE DISORDERS)  
ACCORDING TO THE "HANDLING BEFORE WEANING" EFFECT**

		Not handled rabbits before weaning	Handled rabbits before weaning	Statistical significance
TRIAL 1	Alive	144	153	3.79 p = 0.05 S
	Dead	16	7	
TRIAL 2	Alive	166	173	0.12 p = 0.73 NS
	Dead	7	6	
TRIAL 3	Alive	148	156	2.45 p = 0.11 ± S
	Dead	11	5	
TRIAL 4	Alive	130	125	0.07 p = 0.78 NS
	Dead	5	4	
TOTAL 4 TRIALS	Alive	588	607	5.04 p = 0.02 S
	Dead	39	22	

**Table 3 : ZOOTECHNICAL PERFORMANCES ACCORDING TO THE "HANDLING BEFORE WEANING" EFFECT**

	Handling effect		Statistical significance
	Control group not handled rabbits	Experimental group handled rabbits	
Starting number	627	629	-
Number at the end	588	607	-
Starting live weight 30 days (g)	703.31 ± 96.81	698.57 ± 93.87	NS
Live weight 51 days (g)	1526.67 ± 167.21	1517.32 ± 166.34	NS
End live weight 73 days (g)	2317.63 ± 195.39	2300.32 ± 190.30	NS
ADG 30-51 days (g)	39.21 ± 6.20	38.99 ± 6.03	NS
ADG 51-73 days (g)	35.10 ± 5.91	34.86 ± 5.64	NS
ADG 30-73 days (g)	37.15 ± 3.89	36.89 ± 3.73	NS