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# SOME CHARACTERISTICS OF RABBITS BEHAVIOUR AND THEIR RELATIONSHIP WITH HUSBANDRY SYSTEMS

Summary

The meaning and practical usefulness of applied ethology on rabbits are stressed. In fact rabbits have been recently bred, as compared to the other domestic species; nevertheless they can adapt to intensive husbandry systems in relation to the environment characteristics in which they are kept.

The main traits of rabbits behaviour are briefly outlined, comparing free-ranging animals to the ones kept in intensive housing systems. In particular, attention is paid to reproduction and maternal behaviour, according to the characteristics of the doe, the nest-building behaviour and the environment. Other important topics outlined are the relationship between maternal behaviour and pups reactions and performance; the different behaviour and production of animals kept in cages or on ground pens; the territoriality and spatial distribution of rabbits reared on ground floor.

Also the relationship among behaviour, production and welfare is considered, looking at some particular stressors, such as transportation.

In order to give some examples, some experimental results are reviewed too, related to the different topics of research previously outlined.

Finally, the importance of carrying out behaviour studies on rabbits is stressed, both to better understand the needs of this species, and also to give the breeders more and more indications in order to improve the management of rabbits, together with their production and welfare.

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# SOME CHARACTERISTICS OF RABBITS BEHAVIOUR AND THEIR RELATIONSHIP WITH HUSBANDRY SYSTEMS

The rabbits have been recenly domesticated, compared to the other domestic species. Nevertheless, these animals have been able to adapt to the intensive husbandry systems. The adaptation is mainly affected by the variables shown in Table 1. This could happen following both artificial genetic selection, and the improvement of the housing system in which the animals are bred. In fact the environment characteristics mostly affect rabbits behaviour and performance, and due to this reason it is necessary not to forget that domestic rabbit behaviour is similar to the wild animals, differing mainly in 'frequencies', but 'never has a new behaviour pattern been generated by domestication' (Lehmann, 1987).

In rabbit breeding some environmental features greatly differ from the natural ones. For example, light and dark regime and microclimate can be changed, and the rabbits are generally kept in cages of different size and structure. Moreover, the doe has to be given the nest material before delivery by the breeder, and the size, position and other characteristics of the nest box are determined by the breeder too (Verga et al., 1987). Maternal attitude of the doe has been studied, and some hypothesis have been formulated in order to explain abnormal behaviour that sometimes appears (Table 2 a and b, Verga et al., 1978).

As far as maternal behaviour is concerned, it has been shown that nest building involves two phases, the 'straw nest' and the 'maternal nest' phase: in the first one, the doe builds the nest using the material found in the environment; in the second one, the doe plucks her hair in order to definitely line the nest. According to parity, from first to third delivery, the doe generally improves maternal nest quality, and this could suggest a learning component in this nest building first phase (Canali et al., 1991). Nest quality seems to affect pups characteristics and performance, mainly in relation to the average litter size, to mortality rate, to average pups' weight and to average number of pups at weaning (Table 3) (Canali et al., 1988; Battaglini et al., 1986; Canali et al., 1991 a).

Differences in the behaviour have been found according to the housing system, mainly looking at rabbits reared in cages or in ground pens, and at the density of the group, compared to the behaviour of rabbits under natural or semi-natural conditions (Metz, 1987; Lehman, 1987; Vastrade, 1987; Podberscek et al., 1991). The ethogram of free-ranging rabbits has been rather extensively studied (Mykytowicz, 1958; 1959; 1960; 1961; Denenberg et al., 1969; Lehmann, 1991; etc.). Rabbits are more

active during darkness, mainly in relation to grazing (Mykytowicz & Rowley, 1958). Moreover, the ethogram changes according to age, mainly in relation to the proportion of different activities in the daytime and resting periods above and underground (Lehmann, 1987). As far as social behaviour is concerned, the rabbits establish a rank order according to the beginning of sexual activity, and in general the social behaviour patterns change according to age till the age of 3-4 months, when rabbits socially behave like adult ones (Lehmann, 1991).

Comparing the behaviour of rabbits kept in ground pens or in cages, it has been shown that there are differences in many activities, classified as locomotory, maintenance, comfort and marking/investigatory and agonistic behaviour (Podberscek et al., 1991).

Also Metz (1987) found behaviour differences in rabbits kept in cages vs. rabbits kept in ground pens, showing that "fattening rabbits in cages are less active than those in straw pens".

Some research has been done on behaviour and spacing distribution of rabbits kept in ground pens (Vastrade, 1986; 1987; Stauffacher, 1986). Canali et al. (1991 b) have studied Hybrid and N.Z.W. rabbits kept in ground pens at different densities (1320 sq. cm/head and 580 sq. cm/head). They found no behaviour differences between the two genetic strains, while males have larger territories than females. Moreover, N.Z.W. rabbits show higher resting times than Hybrids rabbits, and the females higher than the males. In higher density, spacing behaviour seems to be less differentiated, but however males again tend to look for a territory of their own. Finally, increased density (580 sq. cm/head) does not give rise to aggressive behaviour, at least in rabbits till slaughtering , at approximately 80 days of age. In conclusion, it seems that rabbits are able to adapt well to rearing system in ground pens even at rather high densities.

Another important topic in rabbit breeding is related to animal stress. In fact many environment factors and management schedules can negatively affect rabbits behaviour and performance. Stress reactions in the rabbit have been already reviewed by Griffiths et al. (1960). More recently, some authors have studied the effects of different stressors on rabbits intensively reared. In Table 4 the main potential stress factors on rabbit sexual behaviour, for example, are summarized.

Finzi et al. (1986) studied the effects of moving in another cage, transportation and noise on rabbit feeding and water intake. They found that "cage changing can be classified as a macro-stressor", while "transport or sound stress can be classified as microstressors". In fact only the first factor significantly reduces feeding intake.

Verde & Piquer (1986) also studied the effects of two different stressors, i.e. heat (32 + or - 2 C degrees) and sound (90 + or -

5 Db, 200 cycl/sec) on rabbit levels of ascorbic acid and plasma corticosterone. They found an opposite trend in the two variables: in fact when plasma corticosterone level rises, then plasma ascorbic acid level decreases. Their results suggest that both the stressors affect these variables, and their conclusion is that "would be of interest to test the effect of supplementing the diet of rabbits with Vitamin C during stress periods". The adrenal weight, on the contrary, does not seem to be a good indicator of stress in caged rabbits. In fact Ferreira et al. (1984) did not find statistical differences in this variable studying rabbits reared at 1200, 900, 720 and 600 sq. cm/head.

Transportation stress effects were studied on rabbits too (Jolley, 1990; Verga et al., 1988). In research carried on over one year, Crimella et al. (1991) assessed the influence of season, distance travelled, transport duration, temperature and relative humidity on the total weight loss (%) and the carcass dressing (%). The results show that mainly the climate and the transport time can affect animal performance (Table 5).

The management schedule can also constitute a stressor for rabbits. The handling of animals, for example, can produce fear reactions that can negatively affect rabbit welfare. Repeated handling, on the contrary, can reduce fear of humans in rabbits (Metz, 1983/84; Anderson et al.,1972; Denenberg et al. , 1973; Wyly et al., 1975). Podberscek et al. (1991) too, found that repeated handling by familiar people can positively affect the behaviour and welfare of caged or penned rabbits. This could be due to a learning process through habituation, and it is very important in keeping laboratory animals.

In conclusion, the topics of applied behaviour studies on rabbits, previously outlined, and their practical applicability to farm animal husbandry, seems to suggest the need to develop this kind of research. This could allow better knowledge of rabbit adaptation potential, in order to improve both their welfare and their performance.

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TABLE 1 - FACTORS THAT COULD AFFECT RABBITS CAPABILITY TO COPE

| | |
|---|---|
| A) HABITAT | climate<br>light and dark regime<br>feeding times<br>feeding characteristics<br>environmental rhythms<br>animal housing systems<br>interaction with conspecifics |
| B) MANAGEMENT SCHEDULE | |
| C) BREED | |

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TABLE 2 (a) - ABNORMAL MATERNAL BEHAVIOUR

-) false pregnancy
-) (presumed) embryo reabsorption
-) abortion
-) failure to build the nest
-) parturition outside the nest
-) failure to suckle
-) cannibalism
-) scattered offspring
-) urination inside the nest

(After Verga et al., 1978)

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TABLE 2 (b) - MAIN CAUSES FOR ABNORMAL MATERNAL BEHAVIOUR IN RABBITS

-) nervousness
-) poor body condition
-) lack of milk
-) bad feeding
-) poor hygiene
-) presence of other animals
-) poor stockman care
-) environmental changes
-) environment too hot
-) overcrowding
-) lack of experience
-) moulting in progress
-) genetic factors

(After Verga et al., 1978)

TABLE 3 - CLUSTER ANALYSIS ON 68 LITTERS OF RABBITS

| VARIABLE | MEAN | CL. 1 | CL. 2 | CL. 3 |
|---|---|---|---|---|
| Parity | 1.7 | 1.5 | 1.0 | 2.3 |
| Temp (C degrees) | 19.3 | 19.9 | 14.7 | 22.8 |
| Relative Humidity | 64.8 | 63.8 | 64.4 | 65.6 |
| Straw Nest Score | 4.2 | 2.7 | 4.1 | 4.8 |
| Hair Nest Score | 2.4 | 1.8 | 2.8 | 2.3 |
| Pups dead at 5 days | 0.9 | 3.6 | 0.4 | 0.2 |
| Pups dead at 30 days | 0.2 | 0.2 | 0.3 | 0.2 |
| Litter weight (g) 5 d. | 695 | 480 | 655 | 810 |
| Litter weight (g) 30 d. | 3251 | 2244 | 2937 | 3894 |
| Pups weaned | 5.2 | 1.1 | 5.1 | 6.9 |

(After Canali et al., 1991)

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TABLE 4 - MAIN CAUSES FOR ABNORMAL SEXUAL BEHAVIOUR

-) climate

-) female stressed

-) bad feeding regime

-) change of cage

-) bad handling

-) environment disturbances (noise, etc.)

-) moon phase

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TABLE 5 - EFFECTS OF SOME TRANSPORTATION VARIABLES ON TOTAL WEIGHT LOSS (%) IN RABBITS

| VARIABLE | | TOTAL WEIGHT LOSS (%) |
|---|---|---|
| Transport duration (hours) | 1 | 1.4 |
| | 3 | 2.6 |
| | 5 | 3.6 |
| | 7 | 4.6 |
| Transport length (Km) | 50 | 3.5 |
| | 100 | 3.0 |
| Temperature (C degrees) | 0- 6 | 1.5 |
| | 9-12 | 3.8 |
| | 15-22 | 3.9 |
| Relative Humidity (%) | 70-75 | 3.8 |
| | 80-85 | 2.5 |
| | 90-95 | 3.0 |
| Season in the year | Fall | 3.6 |
| | Winter | 4.1 |
| | Spring | 4.0 |
| | Summer | 4.2 |

(After Crimella et al., 1991)

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