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Effect of atrophic rhinitis on the behaviour of piglets (preliminary results)

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ABSTRACT

In this study the influence of atrophic rhinitis on the behaviour of pigs was investigated. In the experiment piglets were weaned from their dam at the age of one day and were reared artificially under controlled animal house conditions. The behaviour of a group of uninfected control pigs was compared with those infected experimentally with Pasteurella multocida. The examined behaviour forms were feeding, drinking, resting, social behaviour, scratches and playing. On day 8 after P. multocida infection we observed that the piglets spent less time with eating and social activities than the control piglets while the time they spent with resting increased. Our examination gives solid evidence that reduced activity coincides with reduced time spent with feeding by the animals.
(Keywords: pig, atrophic rhinitis, behaviour)

INTRODUCTION

Atrophic rhinitis (AR) of swine is a long-known and widely prevalent infectious disease of pig populations, characterised mainly by twisting and shortening of the nose. Toxin-producing strains of *Pasteurella multocida* cause damage after colonising the nasal passages. Intranasal challenge of pigs with *P. multocida* can artificially induce AR (*Magyar et al.*, 2002). The damage caused pain (*Diemen et al.,* 1995) and/or the presence of cytokines (IL-1, IL-6) induced by acute inflammation may decrease the feed consumption (*Klasing* and *Johnstone,* 1991*; Langhans,* 2000).

The role of the aerial conditions, management factors and hygiene on AR was investigated by others (*Penny,* 1977; *Robertson,* 1990) and the effect of AR on the production was described, but little is known about the effect of AR on the behaviour of the pigs. As the activity of pigs is related to the heat production, *Diemen et al.* (1995) measured the heat production of the pig treated with *P. multocida* toxin. It seemed to suppress the general well-being of pigs, reducing pigs' activity and food intake. These results indicate the behavioural changes of the pigs suffered by AR but there was no evidence of the behavioural differences. In this study, therefore, the influence of AR connected to behaviour was investigated.

MATERIALS AND METHODS

In the experiment piglets were weaned from their dam at the age of one day and were reared artificially. The computer controlled feeding system provided adequate quantity of milk replacer every hour. Piglets were reared free from the pathogenic agents of AR under controlled animal house conditions. The study contained 14 control and 14

infected piglets, housed separately excluded any contact between the two groups. Piglets in the infected group were pre-treated with 0.5 ml of 0.5% acetic acid in PBS instilled intranasally into each nostril at 6 and 7 days of age, and then were inoculated with 0.5 ml per nostril of toxigenic *P. multocida* suspension (10^5 CFU/ml) at 8 days of age.

The condition of the nasal turbinate bones was examined at the level of the first premolar teeth by computed tomography (CT) just before the infection and after the infection for 12 days (*Magyar et al.*, 2003).

The animals were weighed regularly and on day 8 after infection 9-hour video recordings were made of both groups in parallel by digital cameras. The recordings were analysed using the method of *Molnár et al.* (1998). During the analysis of the video records the appearing frequency data were recorded in every minute. The examined behaviour forms were feeding, drinking, resting, social behaviour, scratches and playing. The behaviour forms were standardized according to *Czakó* (1985).

Feeding behaviour includes the exploration of the food, the recognition, nearing and consuming. The drinking behaviour means simply the water consumption from the drinker. Resting is a neutral stage of the locomotory system which is perceivable from its special position. Resting is frequently interrupted playing but the duration and intensity of these forms is lower compared when they emerge independently.

Social behaviour is a synthetic definition for all the interactions between the individuals of the same group. In our observations, the aggression and the greeting of another animal were listed into this behaviour form. Scratching is behaviour connected to the cleaning and ordering the integument and emerges independently from resting with a high intensity. This form was used only for the scratches itself, in other cases the occasion was identified as social behaviour.

Similarly to the social behaviour, playing is also used as a synthetic definition for different behaviours having an important role during the ontogenesis and the development of the locomotory senses, but has no practical aim.

Playing means generally the manipulation of the food, water and different equipments.

Six behaviour patterns have been observed, in practical terms their presence or absence in a given moment as well as their frequency (i.e. how many of the 14 piglets showed the given behaviour). The data of each behaviour forms was merged and compared to the summarized value of all behaviour forms. Statistical analysis was done by χ^2-probe and percentage rates and the weight means were compared by two-sample independent *t*-test with *SPSS for Windows 10.0* (2001) programme package.

RESULTS AND DISCUSSION

Infection with *P. multocida* after pre-treatment with acetic acid induced the progressive form of AR. In the infected group, the nasal lesions were already severe at 20 days of age as shown by computer tomography. In this short observation period no significant difference was in the mean weights of the groups (3.22±035 and 3.01±0.48 kg; P=0.22). Lower food intake caused by AR might be explained with the reduced activity (*Diemen et al.*, 1995). This assumption was examined by observations. The frequencies of the observed behaviours are shown on *Figure 1*. The highest ratio was set out by resting, which was followed by feeding, social behaviour and playing.

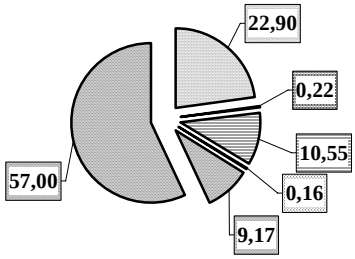
Drinking in both groups was negligible with 0.22 and 0.26% in proportion of the available time. Occurrence of scratching was also minimal (0.16 and 0.11%). Difference between groups was not statistically significant. The control group rested 57% of its

time, while the infected group spent significantly more time, 65.7% with resting (chi^2=103, df=1, P<0.001). This difference arose mainly from the 6% decrease in social behaviour (chi^2=181, df=1, P<0.001). In playing, reduction reach 1% (9.17 and 8.32%, N.S.), but frequency of feeding – though only with 1.6%- significantly (chi^2=4.69, df=1, P<0.05) decreased in experimental group (22.9 and 21.3%).

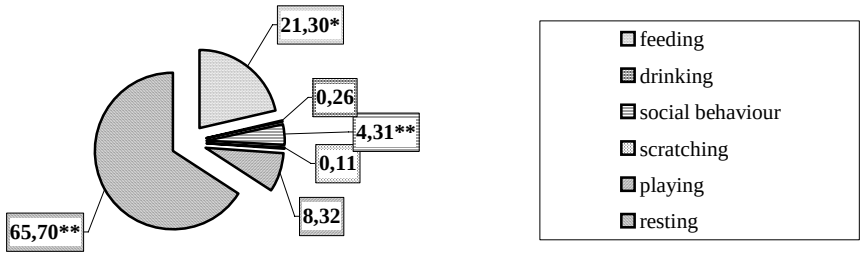
Figure 1

Frequency of the observed behaviour of piglets on day 8 after infection (%)
(* P<0.05; ** P<0.01)

Control group



Infected group



The 8.7% deviation in activity might not be caused by drinking and scratching as their common appearance was almost the same in both groups.

The 1.6% shortening of feeding time mainly was caused by the higher usage of creep feed troughs by control piglets. While in the experimental group only one animal used the trough at a time and for only a short period of time, in the control group the presence of three or four animals at the trough was typical.

The same difference was obvious in the frequency of playing, which is the procedure of exploration behaviour in extensively kept stocks (rummage and massage of the nipples). The use of the nose plays an important role in these forms of behaviour as well, however this was markedly important in social behaviour, where the result of the control was significantly higher with 6.24%. This could be caused by two reasons, which explain the incident in conjunction with each other. The first is the already discussed usage of the nose, which is greatly limited by the pain caused by inflammation in the experimental group, and piglets probably avoid behaviour which is related to the stronger use of the nose. The other reason could be the general spleen caused by the illness.

The biggest difference was experienced in social behaviour. This form of behaviour is a part of comfort behaviour, which is shown by the animals when felt secure and well

being. The infected animals were visibly discomforted, woozy, despondent, and supposedly they were not in the mood for chasing and fighting. In hierarchical fights piglets also use their nose.

Beside the quantitative differences there were qualitative deviations in social behaviour. While in the experimental group this meant chewing the tail or ear of each other, in the control group the proportion of hierarchical fights was higher and chasing could be observed, when in many times every animal in the group was running around in the nursing cage. This behaviour was totally absent in the experimental group, and lower activity was general in their social behaviour. On many occasions the animals lay down or stood about while chewing each other.

CONCLUSIONS

On day 8 after *P. multocida* infection we observed that the infected piglets spent less time with eating and social activities than the control piglets while the time they spent with resting increased.

In the literature, only *Drummond et al.* (1981) referred to the reduction of feed intake caused by AR induced with *B. bronchiseptica*. Our examination gives solid evidence that reduced activity coincides with reduced time spent with feeding by the animals. We assume that this is probably caused by the despondency of the ill animals.

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