The Effect of Atrophic Rhinitis (AR) on the Weight-gain of Swine

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SUMMARY

Atrophic rhinitis (AR) is an infectious disease of swine. Besides the most characteristic clinical symptom, nasal turbinate atrophy, it is presumed to result retarded growth rate as well. The present paper gives a brief overview of the scientific literature concerning the correlation between AR and weight-gain. Pointing out some of the possible reasons of contradictory results on the topic is also attempted.

KEY WORDS

swine, atrophic rhinitis, weight-gain

INTRODUCTION

Atrophic rhinitis (AR) is a widely occurring infectious, multifactorial disease of swine characterised by twisting or shortening of the nose. Two infectious agents, toxigenic strains of *Bordetella bronchiseptica* (Bb) and *Pasteurella multocida* (Pm) are associated with the aetiology of AR. The disease especially came to the front by the spreading of the more concentrated, closed swine herds with high stocking density. Within the hygienic and technological conditions of these establishments, AR may cause more severe nasal lesions. The opinion regarding AR in the veterinary point of view is unambiguous, the protection is more or less solved by antibiotics and vaccines, and we are also aware of the measures realisable by the management, which can influence the prevention of AR and the grade of seriousness of the symptoms.

NATURAL INFECTION AND WEIGHT-GAIN

From the fifties, when spectacular clinical symptoms appeared in a large number, the research of the effect of AR on the weight-gain of swine also started. The objective evaluation of the clinical symptoms is rather difficult, since it is highly biased on the subjectivity of the person making the observations. Therefore an additional slaughter evaluation is advisable, during which the condition of the nasal turbinates can be well determined on the transversal section of the nose. There are investigations based on merely slaughter evaluation. The disadvantage of this is that it cannot securely

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eliminate the loss caused by other pathogens or the management effects (caretaker, building, etc.). Maybe this explains why the results are diverse and why we can find totally contradictory findings in the literature.

Among field conditions Kristjansson and Gwatkin (1955) ascribed for AR a 24 % decrease in weight-gain of young pigs until the age of 56 days. Earl et al. (1962) have also examined naturally infected growers from the age of 56 days until reaching the weight of 80 kg. Based on slaughter examination the weight-gain of animals having nasal lesions of different degree was significantly less than the weight-gain of the animals not showing any nasal lesion. In a swine stock affected by AR Giles (1980) found a significantly decreased weight-gain and increased finishing period in pigs that showed severe nasal lesion at the time of reaching the slaughter weight. Based on slaughterhouse surveys Nielsen (1983) detected severe AR in 6-8 % of the pigs in a herd that was accompanied by an app. 5 % decrease in the weight-gain, and he calculated a loss of 0,5 % concerning the whole herd. In a naturally infected stock Cowart et al. (1990) examined the weight-gain in 85 young pigs and the nasal lesions in the slaughterhouse from the weight of 25 kg until reaching the average weight of 57 kg. The average weight-gain was significantly higher in case of the healthy animals or those showing only a slight alteration compared to the severe cases.

By analysing the data of 1153 pigs on progeny test stations Bendixen (1971) found that nasal lesions did not have significant effect on the weight-gain and the feed conversation rate. Nevertheless, a tendency of having a slightly decrease in weight-gain of affected groups was noticed. It should be noted, however, that the comparison of the animals arriving to the test stations with different bacteriologic status and genetic background carries a number of mistakes.

Scheidt et al. (1990) determined the length of the finishing periods and the daily weight-gain of the animals in three AR-positive herds, and evaluated the nasal turbinates in the slaughterhouse. When the three stocks were evaluated together, and the animals, which have reached the slaughter weight in less than 190 days have been listed in one group, and those reaching it in more than 190 days in another group, the average value of nasal lesions of animals growing slower was significantly lower, therefore the weight-gain of the animals affected by AR exceeded that of the animals having healthy nose. The author explained this hardly understandable data with the low number of the examined animals (n=263). According to our opinion this professionally hardly explainable phenomenon can be made clear by other not examined factors, which disclose the effect of AR on weight-gain.

Until the second part of the seventies the aetiology of AR was not clarified and the scope of the examined animals was limited to the naturally infected cases, which were different from each other in many points of view. The frequency and seriousness of the clinical symptoms in the stocks have been evaluated, although these can be influenced by a number of environmental factors (Penny, 1977). Information concerning the environmental factors (temperature, location density, etc.) is deficient.

By testing the effect of temperature Wilson et al. (1986) have carried out a winter and a summer slaughterhouse evaluation at randomly selected herds. During the summer 66 %, during the winter 56 % of the examined animals had turbinate atrophy. The average nasal scores were also significantly higher during the summer. The average nasal scores have also shown strict correlation with the population density. Scheidt et al. (1992) examined altogether 404 animals in a herd in each of the four seasons concerning the relationship between the time necessary for reaching the slaughter weight, the weight-gain and the nasal lesions. The average nasal lesion score was the highest in spring and the lowest in autumn. According to the authors the high daily temperature fluctuation in autumn, the low temperature in winter and the decreased ventilation in these seasons may lead to frequent development of diseases and may cause decrease in the weight-gain.

Diekman et al. (1993) examined the role of ammonia among the environmental factors exposing 80 gilts to low or moderate concentrations of aerial ammonia. Examining six weeks later, no differences were not found between the degree of nasal lesions or between the weight-gains and the nasal lesions in the groups. Since AR fundamentally develops in the suckling age, in case of gilts ammonia is not probable to be able to cause any alteration in any measurable parameter of AR.

Jolie et al. (1989) attempted Bb and Pm isolation in 317 pigs in the body weights of 20, 40 and 100 kg and examined the degree of nasal lesions at slaughtering. They found significant correlation between the weigh-gain and the nasal lesions. The weight-gain of the animals with severe nasal lesions decreased below 500g/day. No correlation was found between the weight-gain and the bacteriologic results, although it was determined that the number of animals infected by Pm and Bb was lower in case of groups showing a better weight-gain and that no Pm was found in the animals having a weight-gain of 800g/day. The production decrease caused by other pathogens existing in conventional stocks is not unambiguously excluded, not talking about the possible effect of the occasionally used medicines and growth promoters.

THE EFFECT OF VACCINES

After clarifying the role of the two pathogens responsible for the disease, the vaccines have appeared, which contained Bb and Pm bacterins, and later the inactivated toxin of toxigenic Pm. Since pigs are infected in the suckling period, the role of maternal antibodies is of great significance in the early stage of the disease. By giving vaccines to the sows it became possible in the infected stock to compare the production parameters of the pigs having a good protection against the pathogens of AR with those, which have been naturally infected, but are not protected.

Straw et al. (1984) found affected noses in 30,5 % of the 658 growers in the slaughterhouse. They did not find significant correlation between weight-gain and nasal lesions. The animals, which were vaccinated with Bb, have not deviated significantly from those, which were not vaccinated. All this could result from the Pm effect deriving from the lack of protection against Pm.

Bäckström et al. (1985) examined three stocks and used Bb vaccines in two of these. The symptoms of AR have appeared in each stock and significant difference was found between the weight-gain of those animals having diseased and those with a healthy snout. No connection was found between the bacteriologic results and the nasal lesions, although a lower number of Bb-positive animals developed from the stocks immunised with Bb vaccines. All the same the Bb vaccine itself did not prove to be efficient for eliminating the decrease of weight-gain in a stock infected with Pm.

In those herds, where both pathogens and clinical symptoms of AR can be found, the effect of the disease on the weight-gain is well demonstrable and the effectiveness of combined vaccines can also be measured.

Baalsrud (1987a) examined clinical symptoms as well as nasal lesions after slaughtering in case of 711 growers in herds infected by toxigenic Pm. In the slaughterhouse the occurrence of turbinate atrophy was 9-79 %. 43 % of the examined pigs had healthy snout, 43 % showed a slight atrophy and 14 % had serious symptoms. In pigs having severe lesions, the weight-gain decreased by 4,7 % and in case of those with moderate lesions by 1,1 % compared to the animals with healthy turbinates. In herds affected only slightly by AR the time to finishing increased with one day, while in case of serious symptoms the pigs were ready for slaughtering on average 5 days later. In another work of Baalsrud (1987b) the effectiveness of using vaccines was evaluated. Clinical symptoms always decreased after vaccination in those herds, where the presence of toxigenic Pm was proved and remarkable lesions were detected prior to the. In 5 of the 8 stocks infected by toxigenic Pm the weight-gain improved as a result of vaccination, which proved to be significant in two herds. In these 8 herds the weight-gain improved by an average of 2,4 %.

Pejsak et al. (1994) presented the existence of toxigenic Pm and Bb in a herd consisting of 1050 sows. As a result of using the vaccines the frequency of nasal lesions decreased from 92 % to 62 %, while the proportion of the serious cases decreased from 22 % to 10 %. The vaccinated group reached the weight of 100 kg on average in 182 days, while the control group 36 days later, in 218 days. The average daily weight-gain increased to 550 g in the treated group compared to the value of 475 g of the control group.

CONCLUSIONS

According to literature data the proportion of the animals with severe AR lesions is around 5 % in the conventional stocks, while the sub-clinical disease affects approximately 40 % of the animals.

Studies that examined the correlation between nasal lesions and the daily weight-gain led to contradictory results. One of the possible explanations is that we are not aware of important circumstances that could influence the outcome of natural AR infections. In several cases such descriptions are not supported by bacteriologic examinations, the environmental factors (temperature, humidity, dust- and gas pollution) are not declared, and in many cases the herds were also burdened by other veterinary problems, which could distort the results.

Thus, further studies are necessary to know whether AR has any direct or indirect effect on weight-gain of swine.

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