Incidence of Endotoxins in MMA sows on Austrian Pig Farms

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Introduction:

The Mastitis- Metritis- Agalactia (MMA)- complex in sows is a consistent problem in swine producing farms. Over the last years an involvement of endotoxins in the complexity of the symptoms was discussed repeatedly. Endotoxins are present in the circulation all the time. Around farrowing is a critical phase as on the one hand sows are stressed and on the other antibiotic treatment may enhance endotoxin levels.
The aim of this study was to evaluate the incidence of endotoxins on swine farms in Austria. 16 farms with documented MMA problems were chosen and samples of the environment and two sows – one healthy and one treated with antibiotics– were collected. The objective was to test if antibiotic treatment has an influence on the excretion of endotoxins as antibiotics are known to release endotoxin.

Material and Methods:

32 mother sows were sampled between the first and third lactating week. One sow was in a healthy condition and the other sow of the same farm was on treatment (antibiotic) against MMA. Samples taken of the sow were milk, feces and urine. Environmental samples were taken from water, feed and air. Additionally temperature and humidity (EL USB-2 Data logger, RS Components) were measured. For sampling, a protocol was prepared to guarantee a standardized handling method. All samples were tested with the kinetic chromogen LAL (Limulus Amoebycat Lysat) test (CRIVER) within 12 hours after sampling. Feces, air and feed were extracted in Tween20 for 1 hour and dilution series of all samples were prepared. Which sample dilution was tested depended on the sample matrix; for example water samples recovered valid results in lower dilutions (1:10) compared to feces samples (1:10.000). All used material was proven pyrogen free. Performance standards were valid with $r^2 > 0.97$ and the recovery of all samples ranged between 50 – 200%.

Figure 1: Sow farrowing crate

Figure 2: Milk sampling

Results:

Regardless of lactation week, mean endotoxin values in milk (35.5ng/ml; 32.4ng/ml) and urine (17.04ng/ml; 8.08ng/ml) were lower in treated sows. Feces, however, showed a higher mean value in antibiotic treated sows (66.3µg/ml; 81.5µg/ml). Regarding the lactation week a correlation between endotoxin values and treatment could be shown. Untreated sows showed higher endotoxin values in milk and urine in the first week after farrowing compared to treated sows. Values of feces were the other way around and higher values were observed in the first days after farrowing.
Another interesting correlation could be found between lactation number and endotoxin levels in the milk: the higher the lactation number of the sow the less endotoxin could be found in the milk. No correlation of milk endotoxin levels associated with other parameters like ammonia, temperature or feeding system could be observed.

The developments of endotoxin values in milk, urine and feces over a period of three weeks after farrowing:

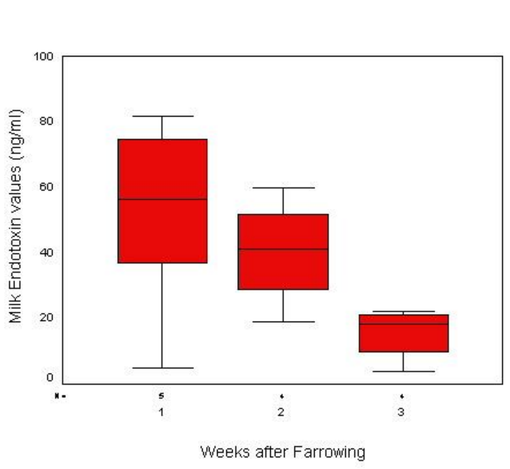

Figure 3: Endotoxin values in milk of untreated sows

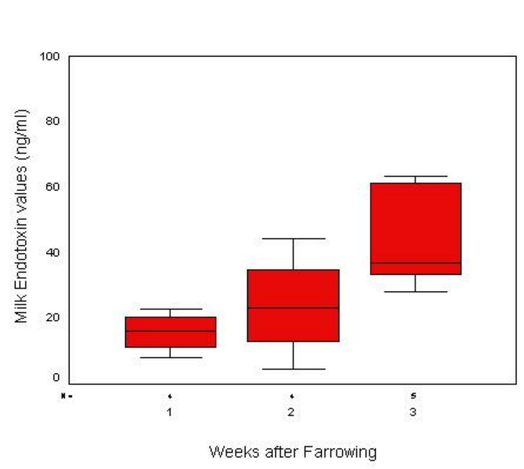

Figure 4: Endotoxin values in milk of treated sows

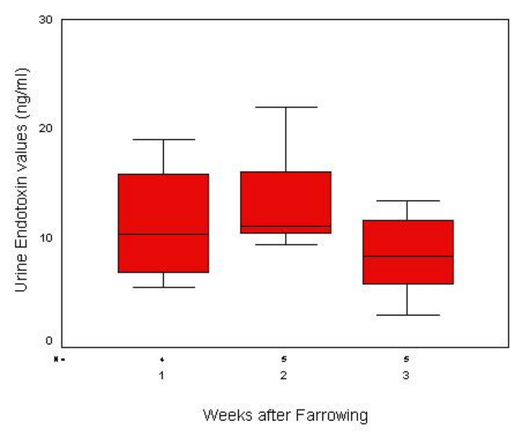

Figure 5: Endotoxin values in urine of untreated sows

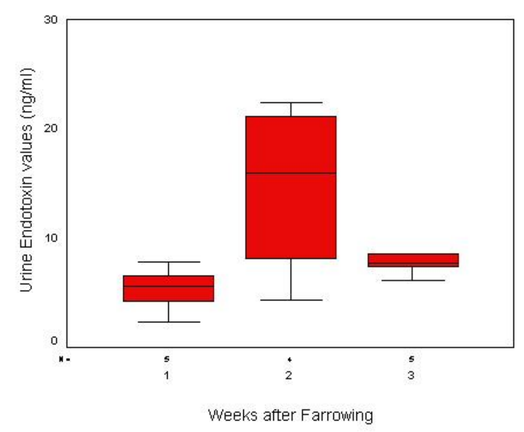

Figure 6: Endotoxin values in urine of treated sows

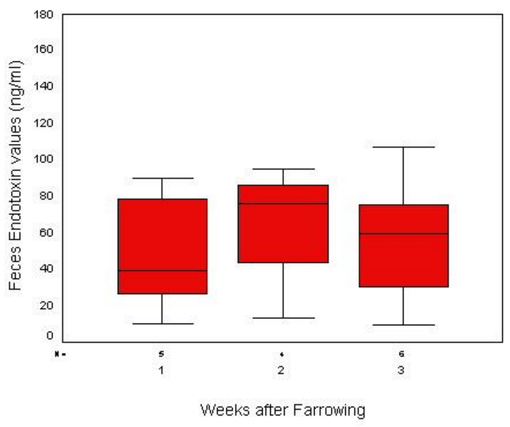

Figure 7: Endotoxin values in feces of untreated sows

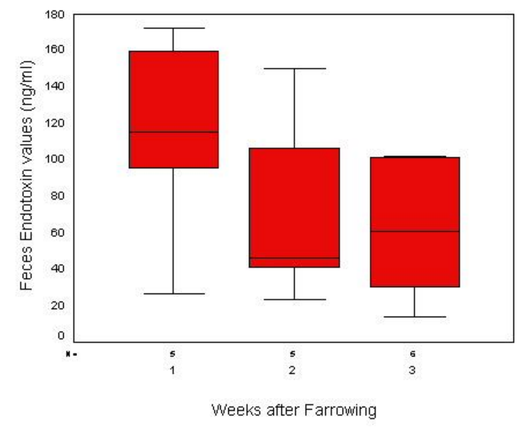

Figure 8: Endotoxin values in feces of treated sows

Conclusion:

The study demonstrates the incidence of endotoxin on Austrian swine producing farms as in all collected samples endotoxins were detected. Concerning endotoxin values there is a difference between antibiotic treated and non treated sows. The fact, that treated sows show increased endotoxin levels three weeks after farrowing in milk and urine samples indicates that antibiotics do not eliminate endotoxins. The enhanced excretion in the feces one week after farrowing demonstrates the positive effect of antibiotic treatment around farrowing, as less endotoxin from bacteria arrives in the circulation. What this delay in excretion of endotoxins means to the piglets will be further investigated in a follow up study, as well as the influence of type of antibiotic applied.

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