Antimicrobial Blood and Lung Tissue Levels in Cattle Fed Aureo S 700® or Oxytetracycline

Abstract

A study was conducted to compare blood and lung levels of Aureomycin (chlortetracycline) and sulfamethazine from Aureo S 700 or oxytetracycline in cattle fed these antimicrobials.

Sixteen calves, averaging 400 lb body weight, were randomly allotted to two groups of four steers and four heifers each. Animals in Group A were fed Aureo S 700 at the levels of 350 mg Aureomycin and 350 mg sulfamethazine per head daily for 5 consecutive days, and those in Group B received oxytetracycline at 2 grams per head daily for 5 consecutive days.

Medication was included in a small amount of feed. The rest of the feed was withheld until all medicated feed was consumed.

Blood samples for Aureomycin, sulfamethazine, or oxytetracycline analysis were obtained from each animal prior to administration of medication on day 1 and on day 4 at 0, 2, 4, 6, 8, 12, 16, 20, and 24 hours after the medication was fed. The last blood sample was taken from all animals on day 5 of medication at 12 hours after treatment was started on that day. Then lung tissue was collected for Aureomycin, sulfamethazine, or oxytetracycline analysis.

Summary

The mean peak blood level of total medication from Aureo S 700 fed at the recommended levels of 350 mg of Aureomycin and 350 mg of sulfamethazine per head daily was 8 times greater than that from oxytetracycline fed at 2 g/head/day (Figure 1).

Although the Aureomycin feeding level (350 mg/head/day) was 5.7 times lower than the oxytetracycline feeding level (2 g/head/day), the Aureomycin and oxytetracycline mean lung tissue levels were similar (Figure 2). In addition, the mean peak lung tissue level of total medication from Aureo S 700 (350 mg/350 mg) was 3 times higher than that from oxytetracycline (2 g) (Figure 3).

Experimental Results – Blood Levels

Mean maximum Aureomycin blood levels in cattle fed Aureo S 700 were 0.017 and 0.013 ppm and occurred between 12 and 16 hours after treatment was initiated on day 4. Mean highest sulfamethazine blood levels were 0.50 and 0.51 ppm at 4 and 6 hours on that day, respectively, after treatment was started.

Mean peak blood levels of 0.017 ppm Aureomycin plus 0.51 ppm sulfamethazine produced a mean peak total medication blood level of 0.527 ppm (Figure 1). This was considerably higher than the mean peak oxytetracycline

FIGURE 1: Mean peak blood levels of medication.

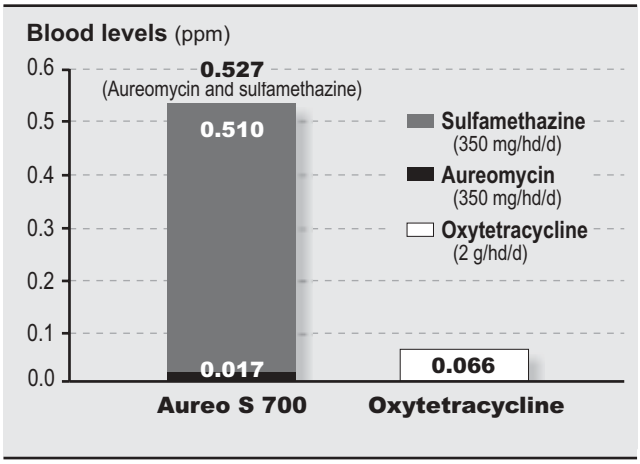
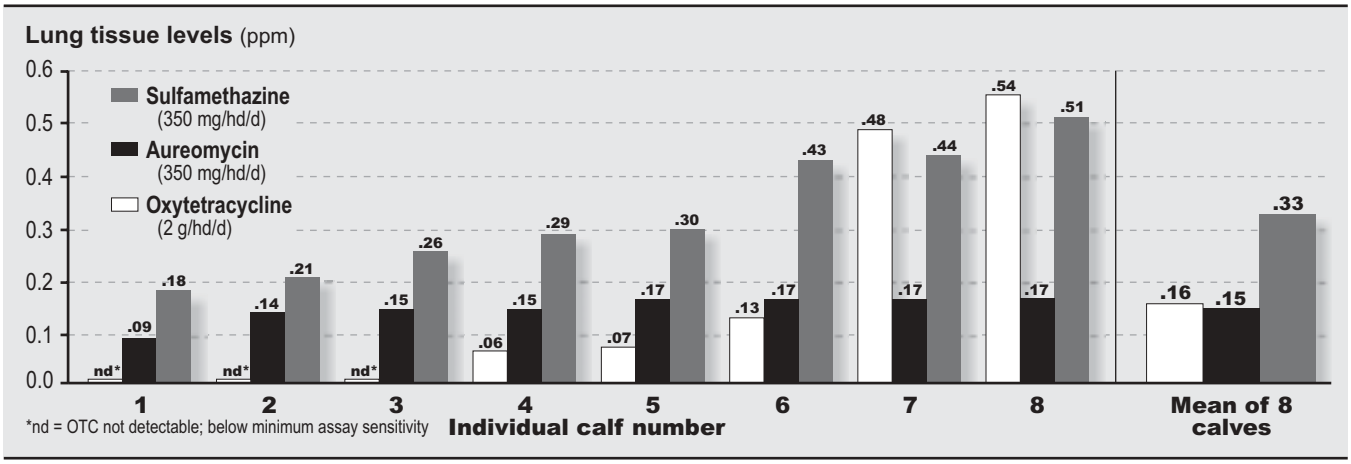


FIGURE 2: Mean and individual animal lung tissue levels of medication.



blood levels, which were 0.066 and 0.057 ppm at 12 and 16 hours on day four after treatment was initiated, respectively.

Lung Tissue Levels

Medication levels in lung tissue of cattle were (Figure 2):

- Aureo S 700:
  - Aureomycin (350 mg/head/day): average 0.150 ppm; range 0.089 to 0.172 ppm
  - Sulfamethazine (350 mg/head/day): average 0.33 ppm; range 0.18 to 0.51 ppm.
- Oxytetracycline (2 g/head/day): average 0.16 ppm; range non-detectable to 0.54 ppm.

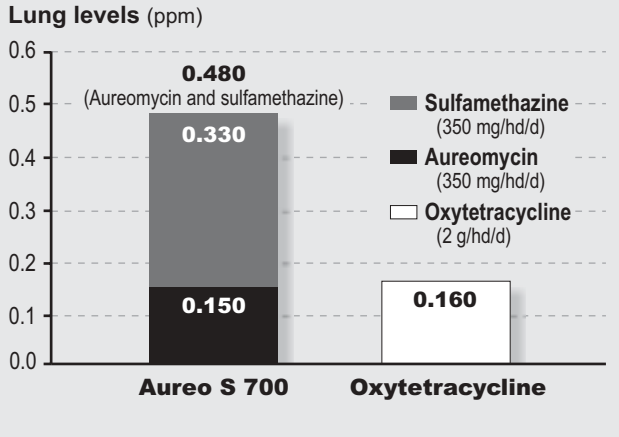
The variation for oxytetracycline was 6.5 times greater than for Aureomycin. This demonstrates the increased confidence that Aureo S 700 will more likely achieve an effective level of tetracycline antimicrobial (Aureomycin) at the infection site than oxytetracycline.

Conclusions

This study demonstrates the greater affinity of Aureomycin and sulfamethazine for lung tissue compared to oxytetracycline, which is important in the control of respiratory disease.

The mean peak lung tissue level of Aureomycin from Aureo S 700 was almost equal to that of oxytetracycline (0.15 vs 0.16 ppm), even though the feeding level of oxytetracycline was 5.7 times higher than the feeding level of Aureomycin (2 g vs 350 mg/head/day) (Figure 3). Also, adding 0.33 ppm, the mean peak lung tissue level of sulfamethazine from Aureo S 700, to that of Aureomycin (0.15 ppm) resulted in a mean peak lung tissue level of 0.48 ppm of total medication. This was 3 times higher than the tissue level of oxytetracycline (0.16 ppm) even though the feeding level of oxytetracycline (2 g/head/day) was 2.9 times higher than the feeding level of total medication from Aureo S 700 (700 mg/head/day).

FIGURE 3: Mean peak lung tissue levels of medication.



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