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## Improper dosing using average cattle weights

### Abstract

A retrospective analysis of 6,231 head of stocker and feeder cattle comprising 24 separate lots was conducted to evaluate the extent and degree of improper dosing that would have occurred in individual animals if all animals in each lot were treated with a single dosage level of a pharmaceutical product based upon the average weight of the lot. Nine hundred forty-six head would have been overdosed by 10% or more, while 831 head would have been underdosed by 10% or more. Four hundred thirty-eight head would have been overdosed by 15% or more, while 366 head would have been underdosed by 15% or more. Two hundred and four head would have been overdosed by 20% or more, while 128 would have been underdosed by 20% or more. Ninety-eight head would have been overdosed by 25% or more, while 35 head would have underdosed by 25% or more.

### Keywords

Cattlemen's Day, 2003; Kansas Agricultural Experiment Station contribution; no. 03-272-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 908; Beef; Underdosage; Stocker cattle; Feeder cattle

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## **IMPROPER DOSING USING AVERAGE CATTLE WEIGHTS**

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### **Summary**

A retrospective analysis of 6,231 head of stocker and feeder cattle comprising 24 separate lots was conducted to evaluate the extent and degree of improper dosing that would have occurred in individual animals if all animals in each lot were treated with a single dosage level of a pharmaceutical product based upon the average weight of the lot. Nine hundred forty-six head would have been overdosed by 10% or more, while 831 head would have been underdosed by 10% or more. Four hundred thirty-eight head would have been overdosed by 15% or more, while 366 head would have been underdosed by 15% or more. Two hundred and four head would have been overdosed by 20% or more, while 128 would have been underdosed by 20% or more. Ninety-eight head would have been overdosed by 25% or more, while 35 head would have underdosed by 25% or more.

### **Introduction**

Most vaccines are designed so that a fixed dose of vaccine is administered irrespective of the size of the animal. Most pharmaceutical products are designed so that the dose to be administered varies based upon the weight of the animal. When utilizing pharmaceuticals, livestock producers commonly treat animals as a group based upon the average weight of the group, rather than determining individual weights and adjusting the dosage for each animal accordingly. As a result, some animals

in the group are properly dosed, while lighter weight animals in the group are overdosed and heavier weight animals are underdosed. The degree to which improper dosing occurs depends upon the degree of weight variation within the group.

Overdosing lighter weight animals may lead to toxicity problems or require extended withdrawal times prior to harvest. Another obvious consequence is money wasted needlessly on excess product cost per animal.

Underdosing heavier weight animals may lead to lack of efficacy of the product involved. Underdosing anthelmintics may result in cattle that still retain a significant worm burden and have poorer performance than anticipated. Underdosing antimicrobials may lead to poor treatment response, including repulls, chronics, or even death losses. Underdosing with these classes of products has potentially far greater economic loss than the expense of excess product typically associated with overdosing.

### **Experimental Procedures**

To develop a feel for the extent and degree of improper dosing that occurs in the beef cattle industry, individual weights previously collected from 6,231 head comprising 24 lots of stocker and feeder cattle involved in field studies at Kansas State University were evaluated. The average in-weight of each lot was calculated, and individual in-weights of

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animals in the lot were compared to the average for the lot. When the actual weight of the individual was less than the average weight of the lot, the degree of overdosing was calculated. When the actual weight of the individual was greater than the average weight of the lot, the degree of underdosing was calculated.

### Results and Discussion

Assuming that the average weight of each lot was used to determine the dosage of either an anthelmintic or a metaphylactic antimicrobial treatment for all animals in the lot, the extent and degree of potential individual animal improper dosing was calculated (Figure 1). Of the 6,231 head

involved, 15.2% (946 head) would have been overdosed by 10% or more; 7.0% (438 head) overdosed by 15% or more; 3.3% (204 head) overdosed by 20% or more; and 1.6% (98 head) overdosed by 25% or more. Over 13.3% (831 head) would have been underdosed by 10% or more; 5.9% (366 head) underdosed by 15% or more; 2.1% (128 head) underdosed by 20% or more; and 0.6% (35 head) underdosed by 25% or more.

While the biological significance of improper dosing was not measured directly in these field studies, product-specific dose titration studies have previously shown that underdosing can contribute to lack of efficacy of dose-dependent products such as anthelmintics and antimicrobials.

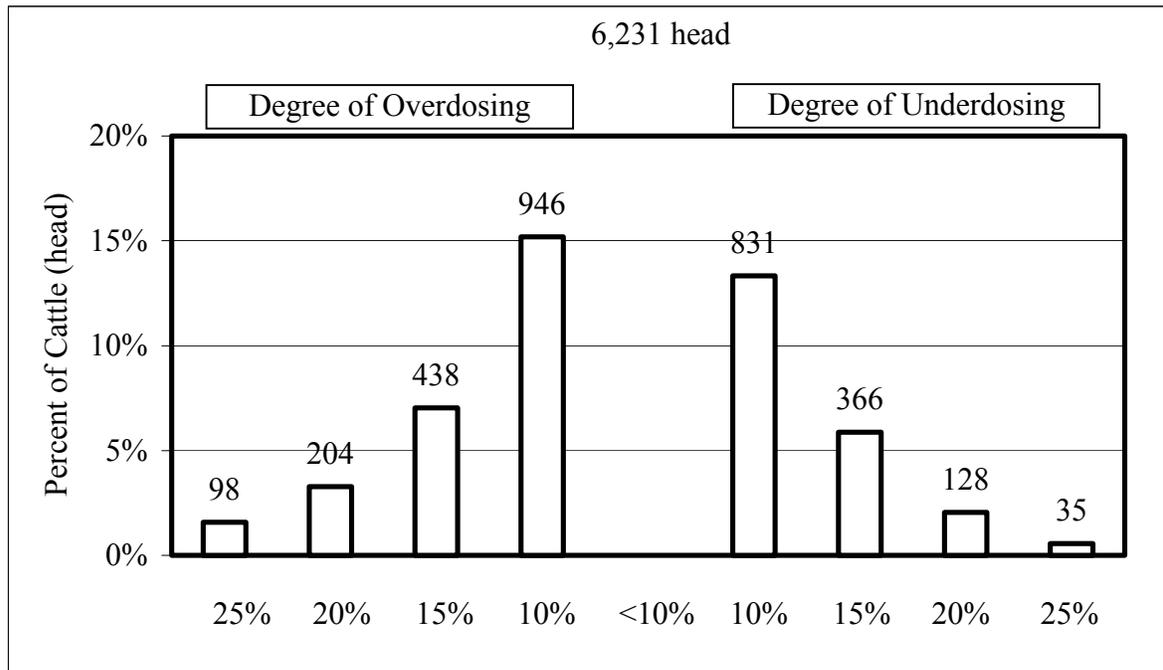


Figure 1. Overdosing and Underdosing Using Average In-Weights.