Centralized Ultrasound Processing to Develop Carcass EPD's

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Introduction

A two-year research project with the American Angus Association concluded in December 1999. This research project was designed to test the concept of a centralized ultrasound processing laboratory (CUP) as a way to process and interpret images that are collected on live cattle by field technicians, stored on zip discs and sent overnight to CUP. Cross sectional and longitudinal images were interpreted by highly trained technicians in the CUP laboratory. Data was electronically submitted to the American Angus Association, adjusted to 365 days of age and returned to the breeder in the same manner as weaning or yearling weight. The carcass trait measurements from ultrasound measurements on live cattle include: ribeye area, 12th rib fat cover, rump fat, a calculated percent retail product, and percent intramuscular fat. The measurements were then used to calculate carcass EPDs from ultrasound.

The objectives of Centralized Ultrasound Processing were:

- To provide the seed stock industry with timely, accurate and unbiased measurements for fat thickness, ribeye area and percent IMF (marbling),
- To assist breed associations in the accurate assembly of data required to generate adjustment factors and EPDs for carcass merit from ultrasound measures, and
- To provide education, training and operational assistance for ultrasound technicians working with breeders.

Results to Date for Centralized Processing

Figure 1 relates the total number of cattle scanned in the CUP program in 1998 and 1999. Two observations can be made from this figure: first, as expected ultrasound scanning of yearling bulls and replacement heifers is seasonal with the peak months being February and March, a result of spring born calves; and second, nearly 5 times as many cattle were scanned in '99 as in '98.

Forty-four technicians submitted images to the CUP laboratory in 1999 (shown in Figure 2). Of the 43,364 head scanned, ten technicians scanned 71.5% of the cattle. Figure 3 indicates that 83% of the cattle were scanned with Aloka equipment, whereas the remaining 17% were scanned with Classic equipment.

Perhaps the most important reason for centralized ultrasound processing is quality control. CUP requires standard equipment, standard protocols for image collection, consistency and accuracy in interpretation, cross checks on problem images and the unbiased reporting necessary for carcass EPD calculations.

When images are submitted to the CUP laboratory by a field technician they are scored by the interpreting technician as acceptable, marginal or rejected. Rejected and marginal images are then cross checked by another lab technician. A thermoprint of the rejected image accompanied by an explanation is sent to the field technician to help correct the problem. If a field technician submits more than 10 percent rejected images he or she is placed on probation until the problem is corrected. All CUP field technicians are required to participate in training, updating, machine calibration, and evaluation on an annual basis.

Tables 1 and 2 contrast images submitted from 10 herds that had high rejection rates with 10 herds that had no images rejected. This quality control system insures that image quality problems can be corrected expediently and limits the number of marginal images that are included in the data base to calculate EPDs.

The centralized processing system also requires complete and accurate identification and contemporary grouping records at the time of image collection and processing so that the data can go immediately into carcass EPD programs.

Implications

Upon completion of this research project the image processing laboratory will transition into a national image processing center housed at Iowa State University. In the year 2000 images will be processed in the CUP laboratory for ten breeds to calculate carcass EPDs. Our goal in 2000 is to scan 100,000 yearling bulls and replacement heifers. Ultrasound data on yearling bulls and replacement heifers will quickly overwhelm carcass data collection on progeny.

In three years ultrasound and centralized processing will change the total beef cattle industry by:

- **Reducing subcutaneous fat by 0.1 inches and maintaining the same intramuscular fat level, or**
- **Increasing marbling score by one degree and maintaining the same level of subcutaneous fat.**

This transition will result in a $1.35 billion savings for the beef industry/year.

Table 1. Images submitted from 10 herds that had the highest incidence of image rejection.

Number Scanned	Marg. Rump	Rej. Rump	Marg. REA	Rej. REA	Marg. Pfat	Rej. Pfat	Total Marg.	Total Rej.	% Marg.	% Rej.
197	0	0	34	14	1	8	35	22	17.77%	11.17%
65	10	3	18	21	12	0	40	24	61.54%	36.92%
120	11	1	6	7	10	8	27	16	22.50%	13.33%
36	0	0	8	8	1	1	9	9	25.00%	25.00%
71	11	0	6	3	1	11	18	14	25.35%	19.72%
68	8	1	5	0	0	10	13	11	19.12%	16.18%
36	0	1	4	6	10	0	14	7	38.89%	19.44%
73	7	0	4	7	26	6	37	13	50.68%	17.81%
42	0	0	0	0	7	9	7	9	16.67%	21.43%
54	0	0	8	0	10	22	18	22	33.33%	40.74%

Table 2. Images submitted from 10 herds that had no rejections

Number Scanned	Marg. Rump	Rej. Rump	Marg. REA	Rej. REA	Marg. Pfat	Rej. Pfat	Total Marg.	Total Rej.	% Marg.	% Rej.
26	0	0	0	0	0	0	0	0	0.00%	0.00%
51	0	0	0	0	6	0	6	0	11.76%	0.00%
44	0	0	2	0	1	0	3	0	6.82%	0.00%
6	0	0	1	0	0	0	1	0	16.67%	0.00%
2	0	0	0	0	0	0	0	0	0.00%	0.00%
168	13	0	6	0	2	0	21	0	12.50%	0.00%
29	0	0	0	0	0	0	0	0	0.00%	0.00%
18	0	0	0	0	2	0	2	0	11.11%	0.00%
10	0	0	0	0	0	0	0	0	0.00%	0.00%
84	0	0	6	0	0	0	6	0	7.14%	0.00%

Figure 1.

1999 Cattle Scaned By Month

Figure 2.

1999 Cattle Scanned By Technician

As of 11/3/99
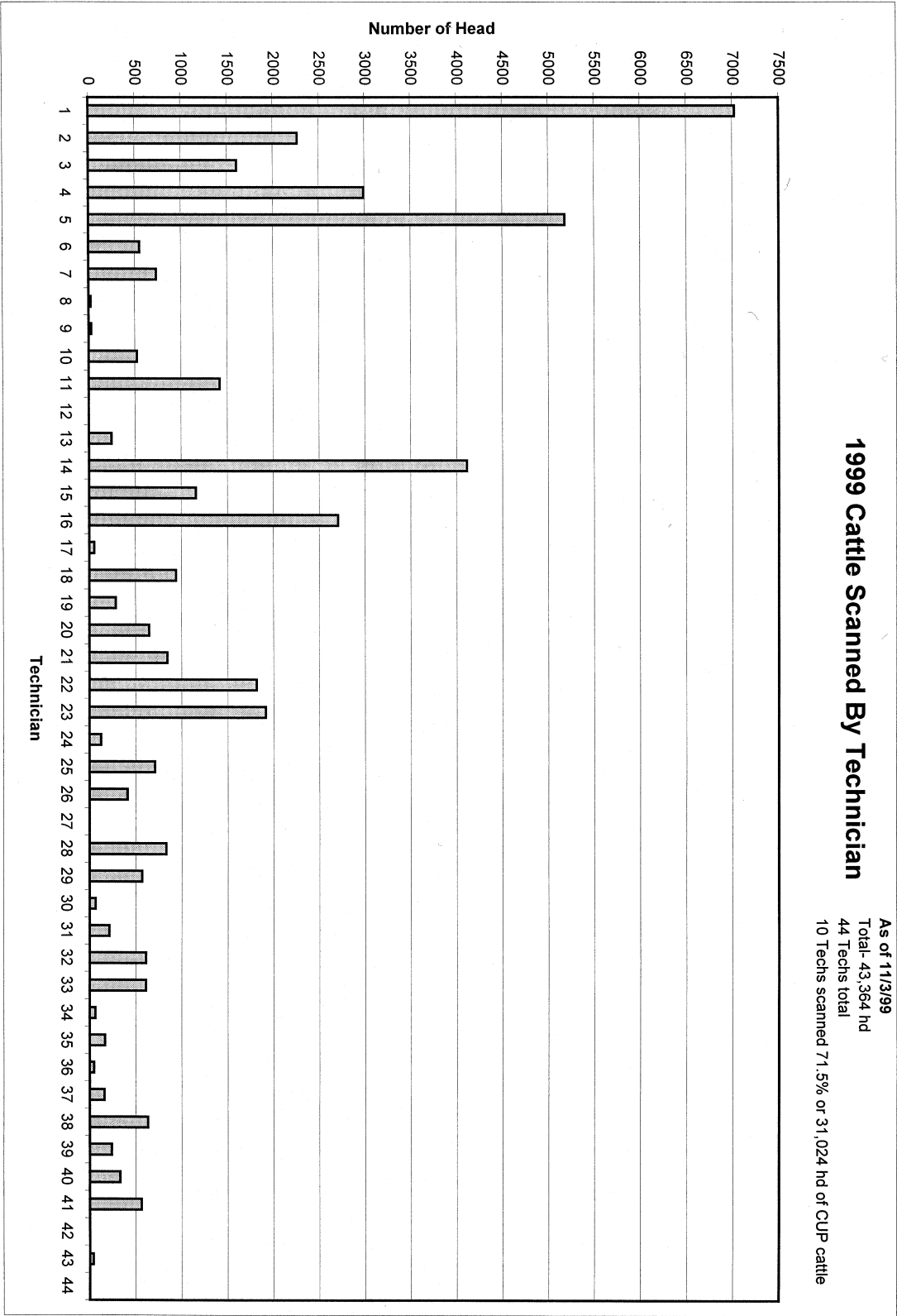Total- 43,364 hd
44 Techs total
10 Techs scanned 71.5% or 31,024 hd of CUP cattle
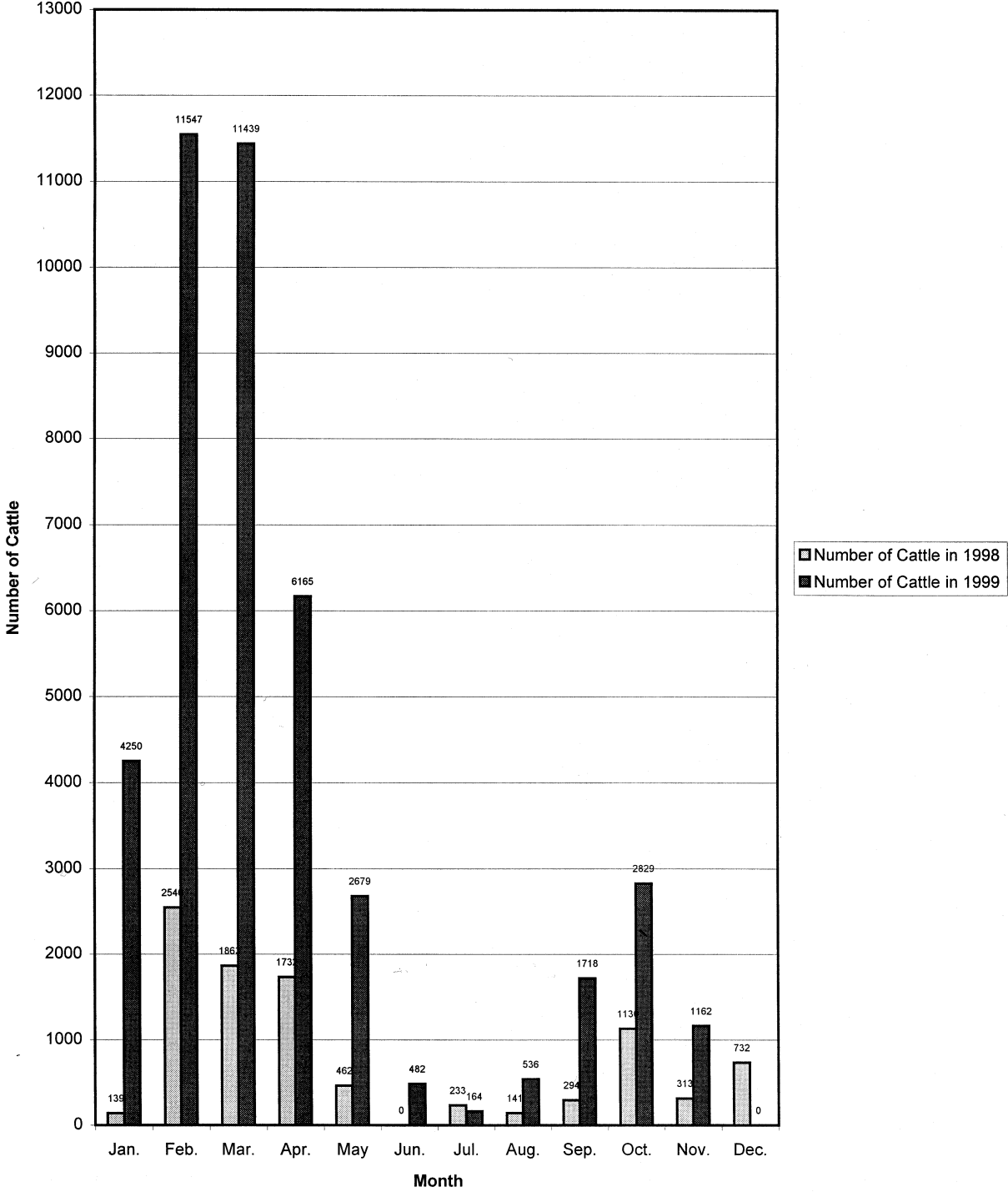
Figure 3.

Summary by Technology