Feedlot Session II

"Making Better Decisions"

Moderator: **Pat Hutson**

Economic Analysis in Beef Feedlot Practice

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The process of converting biology, physiology, and pathology from medical to economic terms can be a complex undertaking. Many veterinary practitioners do this almost subconsciously without complex computer assistance. For these experienced veterinarians, decisions to treat or not to treat and with what drug are often made from the clinical presentation of the animal or animals and the expected outcome or result of various therapeutic options. Determination of the "true economic" cost of animal disease should be an integral component of feedlot animal health.

The problems to overcome when determining the true cost of disease in a feedlot situation are many. The veterinary practitioners must many times overcome the lack of records or records that do not allow for economic evaluation. Other obstacles are the determination of what to measure, quantifying subclinical or inapparent loss, variation from animal to animal or from load to load, and determination of industry standards or comparison factors. These problems coupled with the fact that often the diagnosis of disease is subjective in nature seem to make the precise quantification of disease loss impossible. While these problems are formidable, they are not insurmountable. Let us look at how each of these problems can be overcome and then at a specific situational application.

Lack of Records

Optimally one would need individual sick pull and hospital records for determination of morbidity and the cost of each treated animal. In the face of no records, four options exist for the veterinary practitioner: 1) delay analysis until a record keeping system can be instituted 2) obtain a list of "usual" processing and treatment procedures and the dollar amount of feedlot drugs and medications purchased over a specified time period 3) use USDA, ERS average figures for all animals purchased 4) interview feedlot personnel about the "average" number of treatments per animal and attempt to determine the case fatality rate by working backwards from the number of animals that were removed from the feedlot for death and culling purposes. Each one of these techniques have limitations and a certain amount of inexactness will occur with the use of these techniques. Still these options are better than a figure pulled out of thin air. A technique called sensitivity analysis will be used to quantify the degree of error within an analysis.

Determination of what to measure

When one talks about disease in an economic sense, one is talking about loss of efficiency. These areas of loss can be loosely divided into four sources:

- *direct animal health loss:* includes treatment and prevention expenses, mortality, and animals that are "chronics" that fail to clinically recover from disease and must be salvaged or realized.
- *indirect animal health loss:* includes increased labor to handle sick cattle or potentially sick cattle, increased facility costs to handle more than a "normal" amount of sick animals, increased veterinary services, and increases in other consulting fees to address sick animal needs.
- *secondary production loss:* includes lack of weight gain of morbid animals, increase feed conversion, the increased probability of a "poor-doer". A poor doer is defined as an animal that clinically recovers, but fails to perform as well as its herd mates. There may be a negative loss (and thus a gain) in this category if sick animals fail to eat as much feed as due healthy animals.
- *primary marketing loss:* this is more of a theoretical loss than a real loss and is defined as the loss of

marketing channels because an animal becomes morbid. Only feedlots that sold into antibiotic free beef markets would result in a channel being closed from illness and subsequent antibiotic usage.

- *secondary marketing loss:* this loss is often inapparent and quite variable and is due to increased days on feed of animals that are morbid, resulting in inconsistent bids for cattle with evidence of higher than expected morbidity. Additional marketing losses occur from carcass or organ condemnations, increased regulatory liability, and other limitations on cattle marketing strategies and programs.

Animal Variation

The genetics of the beef breeds found in the US feedlots make this concern a valid one. No research has been performed that has examined the feedlot health effect of breeding programs. In the absence of this research it is often more prudent to divide feedlot types into production groups so that inter-group comparison and analysis is made more valid; the groups that I use are:

- low stress yearling cattle: examples would be stocker calves from wheat or silage growing programs that have been handled as a group prior to arrival at the feedlot.

- high stress yearling cattle: cattle that are put together from a salebarn or multiple origins would fit into this group.

- salebarn calves: groups that are made up of a majority of freshly weaned calves from one or multiple salebarns.

- ranch or farm fresh calves: single origin calves that are transported directly to feedlot or marketed through a salebarn prior to arrival at the feedlot.

Industry Standards

The lack of good information about the animal health costs of animals continues to be a problem. Industry associations such as the Texas Cattle Feeders Association tabulate this data for its members, but some question the validity of the animal health sections because of the self-reporting means of data collection.

The United States Department of Agriculture Economic Research Service publishes "Costs of Production." This book has all farm crops summarized including the feedlot industry divided into costs of production for all feedlots, commercial feedlots, and farmer-feedlots. The animal health costs are shown as "veterinary and medicine" and are listed in dollar costs per hundredweight of live weight sold. The important production data from these sources are shown in Table 1.

Industry Average Costs of Production (1,2)

Average Figures:	ERS(85-88)	TCFA(88)
Purchase Wt	638 lbs	714 lbs
Sale Wt	1100 lbs	1138 lbs
Processing ($/hd)	N/A	$6.63
Treatment ($/hd)	N/A	$1.07
Mortality	N/A	0.92%
Feed Cost of Gain	N/A	$.4915
Cost of Gain	$.6014	$.5210
"Animal Health"	1.10%	1.84%

Table 1 uses average figures from ERS data (1) for the years 1985-1988. These figures are from all feedlots. The figures from the TCFA (2) are twelve month running averages for steers fed at member yards that reported results. Both sets of numbers are variable costs of production and do include a labor and machinery charge. Ownership costs such as taxes and insurance, interest, and general farm overhead are not included in the ERS data, but are implicitly contained in the TCFA data because all costs are reported with the feedyard's markup included. While these data offer a wide variation, they can be used for a standard when no other exists. In the face of no research data, this is better than nothing or a figure pulled from thin air.

Beef Production Economics Software

Using Lotus 1-2-3 (3), a macro-driven spreadsheet was created for the quick determination of economic losses in U.S. feedlots (4). The primary reason for the development of this package was to facilitate analysis by the veterinary practitioner. Specifically , the spreadsheet can be used to put biology into economic format, to focus the practitioner towards cost: benefit decision making, and to offer a means of putting the abstract nature of feedlot consultation services into a more concrete structure. The program is divided into six sections that perform the following tasks:

Section 1. Processing Section - the user chooses procedures, medications, and costs. The program is automatically costed out by total and costs are allocated to health, production, and labor.

Section 2. Mass Medication Section - organized like the processing section, this section accounts for only the mass medication portion of the animal health program. The user must then allocate all mass

medication to one of eight disease choices present in the allocation chart.

Section 3. Treatment Section - organized like the previous two sections, the user must determine the choice of treatment for each of the eight diseases and the length of the treatment period.

Section 4. Disease Section - the section forms the basic probability states of occurrence for the eight possible diseases. The user must select the percent morbidity of each disease relative to the total amount of disease, the case fatality rate, the treated death rate and the chronic rate. The section also contains two sub-sections where the user can use referenced performance data for calculation of disease loss due to performance loss and feed intake disruptions.

Section 5. Morbidity Mortality Section - the user determines by average and scenario analysis the total overall morbidity expected. Expected valuation calculations are used to determine the expected morbidity rate by disease. Prior information is used to predict mortality.

Section 6. Economic Analysis - this section pulls appropriate numbers from the previous sections and with input cost values calculates losses due to treatment, mass medication, performance loss, feed loss (savings), mortality loss, and cull loss.

Examples of these sections are included at the end of this discussion.

Summary

The economic evaluation of disease is an essential component of today's animal health program. Once the practitioner understands the principles that are used in calculation, better medical-production decisions are possible. While this discussion detailed the use of a sophisticated spreadsheet, the practitioner can easily do a crude analysis with pencil and paper once the concepts are clearly understood.

References

1. USDA/Economic Research Service. 1989. Economic indicators of the farm sector. Costs of production-livestock and dairy, 1988. ECIFS 8-3. Rockville, MD. 2. Texas Cattle Feeders Association, 1990. INDEX (Industry Data Exchange) - May 30, 1990. Amarillo, TX. 3. Lotus 1-2-3, Release 2. 1985. Lotus Development Corporation. Cambridge, MA. 4. Jordan, T. 1990. Beef Cattle Production Economics: Fedlot Animal Health Program. In Press.

BEEF HERD ECONOMICS - ANIMAL HEALTH PROGRAM

SECTION 1. EXAMPLE FEEDLOT

PROCESSING PROGRAM - GROUP: NUMBER 1 OAKIE STRS
DATE: 09/11/90

CATEGORY	USE	DESCRIPTION	COST/HD
VACCINE 1		IBR-BVD-PI3	
VACCINE 2	1	7 WAY CLOSTRIDIAL	$0.25
VACCINE 3	1	IBR-BVD-PI3-RSV	$0.45
BACTERIN 1		PAST-HEMOPHILUS	
BACTERIN 2		LIVE PASTEURELLA	
INT PARA CON	1	IVOMEC	$2.25
EXT PARA CON		CO-RAL	
IMPLANT 1	1	RALGRO	$0.92
REIMPLANT	1	RALGRO	$0.92
VITAMIN 1	1	A & D	$0.09
VITAMIN 2	1	B 12	$0.20
ANTIBIOTIC 1		PENICILLIN	
ANTIBIOTIC 2		LA-200	
CHARGE 1/HD	1	CHUTE CHARGE	$0.50
CHARGE 2/HD	1	REVACCINATION CHARGE	$0.25
CHARGE 3/HD	1	REIMPLANT CHARGE	$0.25
OTHER 1	1	REVACCINATION: IBR-BVD-PI3	$0.25
OTHER 2			

COST OF PROCESSING PROGRAM	PER HD	$6.33
PROCESSING PROGRAM - HEALTH	PER HD	$3.20
PROCESSING PROGRAM - PRODUCTION	PER HD	$2.13
PROCESSING PROGRAM - LABOR	PER HD	$1.25

BEEF HERD ECONOMICS - ANIMAL HEALTH PROGRAM

SECTION 2. EXAMPLE FEEDLOT

MASS MEDICATION PGM GROUP: NUMBER 1 OAKIE STRS
DATE 09/11/90

PRODUCT	USE	DOSE/HD	COST/HD
OXYTET 100		25	
LA-200		25	
PEN G	1	15	$0.45
LONG ACT PEN		15	
SPECTAM		25	
LS 50		15	
NAXCEL		5	
ERYTHROMYCIN		15	
TYLAN		15	
SULFA BOLUS		5	
VITAMIN B 12	1	10	$0.20
VACCINE 1		2	
VACCINE 2		2	
CHARGE 1/HD		1	
CHARGE 2/HD			
CHARGE 3/HD			
ABIC FEED 1		1	
ABIC FEED 2			

COST OF MASS MEDICATION PGM	PER HEAD	$0.65
MASS MEDICATION PRM - INJECT	PER HEAD	$0.65
MASS MEDICATION PGM - FEED	PER HEAD	
MASS MEDICATION PGM - LABOR	PER HEAD	

MASS TREATMENT FOR WHICH ONE DISEASE?
ENTER 1 BY THE DISEASE

FIRST PULL RESP	1
RESP REPULL	
RESP RETREAT	
BLOAT	
DIARRHEA	
RET PLACENTA	
ASSISTED CALVING	
FOOT ROT	

SECTION 3. EXAMPLE FEEDLOT

TREATMENT PGM AVE WEIGHT: 400 LBS

DATE 09/11/90

PRODUCT	UNIT COST	CWT DOSE	INJECT COST	DAYS TX->	RESP 3	RP 3.7	RRT 3.7	BLOAT	SCOURS	R/P	CALV	FR	PRODUCT
OXYTET 100	$0.03	5	$0.58		1.00								OXYTET 100
LA-200	$0.10	5	$1.96		0.30								LA-200
PEN G	$0.02	3	$0.24				1.00						PEN G
LONG ACT PEN	$0.03	2	$0.24										LONG ACT PEN
SPECTAM	$0.06	5	$1.20			1.00							SPECTAM
LS 50	$0.06	5	$1.20										LS 50
NAXCEL	$0.40	1	$1.60			1.00							NAXCEL
ERYTHROMYCIN	$0.06	3	$0.72		1.00								ERYTHROMYCIN
TYLAN	$0.06	3	$0.72										TYLAN
SULFA BOLUS	$1.00	0.5	$2.00										SULFA BOLUS
VETISULID	$0.07	10	$2.80				1.00						VETISULID
ANCOSUL	$0.06	6.25	$1.50										ANCOSUL
AMPICILLIN	$0.30	3	$3.60										AMPICILLIN
VITAMIN	$0.05	2.5	$0.45		1.00	1.00	1.00						VITAMIN
SUPPORTIVE	$0.05	2	$0.36		1.00	1.00							SUPPORTIVE
HOSP CHG	$1.00	PER HEAD	$1.00		1.00	1.00	1.00						HOSP CHG
OTHER CHG	$0.50		$0.50		1.00	1.00	1.00						OTHER CHG
COST OF TREATMENT PER DAY OF THERAPY					$4.20	$5.11	$4.99						
TOTAL COST OF TREATMENT FOR THERAPY LENGTH					$12.59	$18.91	$18.46						

COMPLETE COST = $ 49.96

HEALTHY COST = $ 13.40

BEEF FEEDLOT ECONOMICS - ANIMAL HEALTH PROGRAM

SECTION 4. EXAMPLE

FEEDLOT CATTLE DISEASE BREAKDOWN GROUP: NUMBER 1 OAKIE STRS

DATE 09/11/90

	ABBR	FULL NAME	MORBIDITY DISTRIBUTION	CASE FATALITY RATE	TREATED DEATH RATE	UNTREATED DEATH RATE	TOTAL DEATH RATE	CULL/CHRONIC RATE
DISEASE 1=	RESP	FIRST PULL RESP	87%	5%	1.27%	0.25%	1.52%	1.02%
DISEASE 2=	RP	RESP REPULL	9%	10%	0.26%		0.26%	0.18%
DISEASE 3=	RRT	RESP RETREAT	4%	20%	0.23%		0.23%	0.16%
DISEASE 4=	BLOAT	BLOAT						
DISEASE 5=	SCOURS	DIARRHEA						
DISEASE 6=	R/P	RET PLACENTA						
DISEASE 7=	CALV	ASSISTED CALVIN						
DISEASE 8=	FR	FOOT ROT						
			100%		1.77%	0.25%	2.02%	1.35%

PERFORMANCE LOSS - LIGHTWEIGHT CALVES ON GROWING RATION

	ADG* WELL	ADG* SICK	MORBIDITY* FACTOR	ADG** WELL	ADG** SICK	MORBIDITY** FACTOR	ADG**ADG*** WELL SICK	MORBIDITY*** FACTOR
CALVES WITH MODERATE ILLNESS	2.75	2.50	90.91%			N/A		N/A
CALVES WITH SEVERE ILLNESS	2.75	2.35	85.45%			N/A		N/A
CALVES WITH ILLNESS OF ALL DEGREES	2.75	2.40	87.27%	1.96	1.39	70.92%		N/A

* Reference Jordan 1986
* Reference TXAES 1988
* Personal Source

VALUE USED 87.27%<--- INPUT VALUE IS EXPRESSED AS PERFORMANCE OF MORBID CASES AS A % OF HEALTHY CASES

FEED COST OF SICK ANIMALS - LIGHTWEIGHT CALVES ON GROWING RATION

FEED INTAKE AS % OF BW	MEAN	SD
FEED INTAKE OF HEALTHY CALVES	3.03	0.43
FEED INTAKE OF MORBID CALVES	2.68	0.68

VALUE USED 90.41%<--- INPUT VALUE IS EXPRESSED AS FEED CONSUMPTION OF MORBID CASES AS A % OF HEALTHY CASES

SECTION 5. EXAMPLE FEEDLOT

MORB:MORTALITY PROJECT GROUP: NUMBER 1 OAKIE STRS

DATE 09/11/90

PREDICT MORBIDITY FOR ALL CAUSES

	DIST.	STARTING PERIOD PROJECT 25%	STARTING PERIOD WORSE 40%	STARTING PERIOD BEST 5%	FEEDING PERIOD PROJECT 5%	FEEDING PERIOD WORSE 5%	FEEDING PERIOD BEST 5%	TOTALS ENTIRE PERIOD PROJECT 30%	TOTALS ENTIRE PERIOD WORSE 45%	TOTALS ENTIRE PERIOD BEST 10%
% ANIMALS WILL GET FIRST PULL RESP	87%	21.75%	34.80%	4.35%	4.35%	4.35%	4.35%	26.10%	39.15%	8.70%
% ANIMALS WILL GET RESP REPULL	9%	2.25%	3.60%	0.45%	0.45%	0.45%	0.45%	2.70%	4.05%	0.90%
% ANIMALS WILL GET RESP RETREAT	4%	1.00%	1.60%	0.20%	0.20%	0.20%	0.20%	1.20%	1.80%	0.40%
% ANIMALS WILL GET										
% ANIMALS WILL GET										
% ANIMALS WILL GET										
% ANIMALS WILL GET										
% ANIMALS WILL GET										
	100%									

SUMMARY OF EXPECTED/PREDICTED RESULTS

HOW OFTEN WILL PROJECTED CASE SCENARIO OCCUR? 68%

HOW OFTEN WILL WORSE CASE SCENARIO OCCUR? 16%

HOW OFTEN WILL BEST CASE SCENARIO OCCUR? 16%

	EXPECTED MORBIDITY RATE	PREDICTED MORTALITY RATE
FIRST PULL RESP	25.4%	1.52%
RESP REPULL	2.6%	0.26%
RESP RETREAT	1.2%	0.23%
BLOAT		
DIARRHEA		
RET PLACENTA		
ASSISTED CALVING		
FOOT ROT		
TOTAL	29%	TOTAL 2%

SECTION 6. EXAMPLE FEEDLOT TO UPDATE INPUT VALUES ALT R

ECONOMIC ANALYSIS OF DISEASE LOSSES GROUP: EXAMPLE FEEDLOT
DATE 09/11/90

	TMT LOSS	MASS MED LOSS	PERFORM LOSS	FEED LOSS	CULL LOSS	MORT LOSS	TOTAL LOSS	LOSS/ HEAD	LOSS/ CASE
FIRST PULL RESP	$3.20	$0.65	$12.20	($1.96)	$3.43	$1.43	$18.95	$18.95	$74.60
RESP REPULL	$0.50		$1.26	($0.20)	$0.59	$0.25	$2.40	$2.40	$91.19
RESP RETREAT	$0.22		$0.56	($0.09)	$0.53	$0.22	$1.43	$1.43	$122.73
TOTALS	$3.91	$0.65	$14.02	($2.25)	$4.55	$1.90	$22.78	$22.78	

INPUT VALUES			REFERENCE VALUES
NUMBER OF CATTLE	1	HEAD	USE 1 HEAD FOR QUICK CALCULATION
AVERAGE ARRIVAL WEIGHT	400	LBS	USE PURCHASE OR PAY WEIGHT
PURCHASE COST/CWT	$95.00	PER CWT	USE PURCHASE PRICE
COST FOR FINISH RATION (DM)	$125.00	PER TON	) IF UNKNOWN USE COST OF GAIN FIGURE:
EXPECTED F/G (DM)	6.00	LBS FEED/LB GAIN	)$60.14/CWT USDA ERS 1985-1988 VARIABLE COG
OTHER DAILY COSTS (YARDAGE)	$0.63	PER DAY	) OFTEN USED FOR ADJUSTING FOR NON-FEED COST
EXPECTED ADG	2.80	PER DAY	CALVES 2.25-2.8 & YEARLINGS 2.50-3.25 LBS/DAY
EXPECTED SALE WEIGHT	1000	LBS	1000-1050 = HFRS & 1100-1150 = STRS
EXPECTED SALE PRICE/CWT	$65.94	PER CWT	$65.94/CWT USDA ERS 1985-1988 LIVE CATTLE $
EXPECTED WEIGHT OF CULLS	400	LBS	CULLS/CHRONICS EQUAL TO INCOMING WEIGHT
EXPECTED SALE PRICE/CWT CULLS	$45.00	PER CWT	$45.00/CWT AVERAGE CULL COW $ 1987-1988
EXPECTED SALE DOF FOR CULL	75	DOF	60-90 DAYS OFTEN USED
EXPECTED AVE DAY OF MORBIDITY	10	DOF	10-14 DAYS OFTEN USED
EXPECTED AVE DAY OF MORTALITY	30	DOF	25-35 DAYS OFTEN USED

COST OF LOST INTEREST NOT INCLUDED