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A six year summary of feedlot health records from the Opportunities Farm^{1,2}

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SUMMARY

Livestock housing at the Opportunities Farm is comprised of three different cattle feeding pen designs. The three pen designs are a monoslope barn (MON), open pens (OPN), and open pens with shelter over the feeding area (OS). Analyses of 6 years of data ranging from 2008 through 2013 were conducted. Morbidity and mortality rates for each year were compared for all cattle fed during the six year interval, regardless of feeding facility design. Cattle fed at the Opportunities Farm during this period had morbidity and mortality rates equivalent to what would be expected by feedlots throughout North America. Morbidity significantly differed by year. Specifically, year influenced incidences of respiratory disease, foot rot, and lameness but had no effect on mortality. A comparative analysis of the effect of feeding pen design on cattle health was conducted. The OPN design had higher total morbidity and incidence of respiratory disease than the OS design. No differences relative to facility design were found for any other animal health measure.

INTRODUCTION

Opportunities to feed cattle in the Northern Plains states continue to expand. With this expansion, different feeding facility designs are a common discussion among producers. Little information about cattle feeding pen designs and its impact on animal health is available to feedlot managers common to this geographic area. Cattle morbidity and mortality rates impact the success of a feedlot from both an economic and animal welfare perspective. Some studies have found overall morbidity rates to be 15-45% and mortality rates to be 1-5% for feedlot cattle (Irsik et al., 2006; Kelly and Janzen, 1986; Loneragan et al., 2001), but none have specifically compared feeding facility designs. Investigations of the impacts of feeding facility design on cattle health and welfare will assist feedlot managers and allied industry experts in making management decisions. The objectives of these analyses were 1) summarize the overall health performance of cattle fed at the Opportunities Farm during the period from 2008 to 2013, regardless of feeding facility design and 2) determine if feeding facility design has an impact on cattle health.

MATERIALS AND METHODS

The Opportunities Farm is a production-scale teaching classroom and outreach laboratory that consists of three unique cattle feeding facilities. The three cattle feeding facilities consist of 1) a monoslope barn

¹ Salaries provided by the Opportunities Farm or state and federal funds appropriated to South Dakota State University.

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(MON), 2) dirt-mound open pens (OPN), and 3) partially-covered pens (OS). An expanded description of the three facilities can be found in the 2006 South Dakota Beef Report (Loe et al., 2006).

Data were obtained from 2008 to 2013 for the three facility designs at the Opportunities Farm near Lennox, SD. The cattle fed were typical of those in the region including predominantly Angus or Angus influenced cattle. Calves received during the fall typically arrived newly weaned and calves received at other times of the year were typically backgrounded. Occasional groups of long yearlings were received in July through September. The start and end dates for the record review were determined by the date that lots of cattle were shipped. Any unclear records were removed from the data set prior to analysis. A total of 10,609 head of cattle were placed into the Opportunities Farm feeding facilities during the review period.

Health records for treated animals typically included cattle ID, date, approximate weight, rectal temperature, number of times treated, treatment administered, dosage, illness diagnosis, and any additional comments. Death loss records typically included date, cattle ID, and suspected cause of death (some causes confirmed by necropsies).

Cattle morbidity was classified into six categories: respiratory, foot rot, lameness, pinkeye, digestive, or other based on individual treatment records. Respiratory included any diagnosis indicated as respiratory or diphtheria. Foot rot included diagnoses solely indicated as foot rot. Lameness included lameness/limps, leg wounds, or arthritis/sore joints, and edema. Pinkeye included only diagnoses of pinkeye. Digestive included any diagnosis indicated as digestive, enterotoxemia, coccidiosis, or bloat. The Other category included diagnoses indicated as hardware disease, nervous/uncoordinated, prolapse, haemophilus, droopy, or non-specific. Morbidity rates for each pen were calculated by dividing the number of animals treated by the number of cattle placed in the pen times 100. Total morbidity is the cumulative incidence of all health records.

Cattle mortality was classified into three categories: respiratory, digestive, and other. Respiratory cases included any diseases of the respiratory tract or mycoplasma. Digestive cases include any diseases of the digestive tract and abdominal abscesses. Other cases included any other diseases that do not fit into the respiratory or digestive categories (e.g. hardware disease, suicides, heat stress). Mortality rates for each pen were calculated using the same method as morbidity rates.

A summary of all of the cattle fed at the Opportunities Farm, regardless of feeding facility design, was conducted. All morbidity and mortality variables were assessed with a completely random design using the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC) with shipping date as the fixed effect.

Feeding facility was analyzed with a completely random design using the MIXED procedure of SAS with feeding facility as the fixed effect and lot of cattle as the random effect. This analysis was conducted using only common lots that were randomly allocated across the three feeding facilities to reduce the potential for the results to be confounded by origin and previous animal history. This analysis utilized a subset of the entire database including 54 observations.

RESULTS AND DISCUSSION

Total morbidity differed across year ($P < 0.01$; Table 1). Incidences of respiratory disease, foot rot, and lameness were impacted by year ($P \leq 0.05$). Cattle mortality did not differ by year ($P \geq 0.10$). The effect of year on cattle health is most likely influenced by variations in cattle source, cattle type, previous calf

history, weather, exposure to disease vectors, and pathogen load. During 2011 to 2013, several lots were administered metaphylaxis (mass medication) treatments (oxytetracycline dehydrate/flunixin meglumine^a, ceftiofur crystalline free acid^b, or tilmicosin phosphate^c). The lots administered these treatments were high-risk weaned calves (BW typically around 500 lb) that experienced either drought or storm stress or were newly weaned calves purchased from a sale barn. These particular incidences exemplify the impact that cattle source, cattle type, and previous calf history can have on post-arrival health.

The results of the feeding facility comparison should be evaluated with caution given the small number of pens per facility (Table 2). The OPN design had higher incidence rates for total morbidity ($P = 0.02$) and respiratory cases ($P = 0.03$) than the OS design. No differences ($P > 0.20$) in designs were found for any other animal health measure.

ENDNOTES

^a Hexasol Injection, Norbrook Laboratories Ltd., Newry, County Down, Northern Ireland.

^b Excede Sterile Suspension for Cattle, Zoetis Animal Health, New York, NY.

^c Micotil 300, Elanco Animal Health, Indianapolis, IN.

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Table 1. Morbidity and mortality rates by year at the Opportunities Farm from 2008 to 2013¹

	2008	2009	2010	2011	2012	2013	SEM	P-value
Pens of cattle	21	27	15	20	22	25	-	-
Cattle fed, head	1,684	2,112	1,236	1,623	1,852	2,102	-	-
Total morbidity, %	2.6 ^a	3.6 ^a	8.5 ^b	9.5 ^{bc}	15.5 ^d	11.1 ^{cd}	2.5	< 0.01
Respiratory	0.44 ^a	2.2 ^{ab}	2.5 ^b	5.8 ^c	12.1 ^d	7.7 ^c	2.0	< 0.01
Foot Rot	0.77 ^a	1.3 ^{ab}	5.5 ^c	2.3 ^b	1.4 ^{ab}	1.3 ^{ab}	1.2	0.05
Lameness	0 ^a	0 ^a	0.17 ^b	0.48 ^{cd}	0.39 ^c	0.58 ^d	0.16	< 0.01
Pinkeye	1.4	0	0.08	0.19	0.73	0.78	0.47	0.09
Digestive	0	0.05	0.16	0.38	0.45	0.24	0.16	0.11
Other	0.17	0.05	0.42	0.58	0.92	0.77	0.29	0.06
Total mortality, %	0.47	0.71	0.99	0.62	0.66	0.92	0.26	0.61
Respiratory	0.12	0.10	0.07	0.12	0	0.14	0.08	0.74
Digestive	0.18	0.29	0.17	0.13	0.40	0.29	0.16	0.73
Other	0.17	0.3	0.75	0.3	0.26	0.49	0.17	0.14

¹Year was determined by date that cattle were shipped.

^{a,b,c,d}LSmeans within a row with different superscripts differ (P -value \leq 0.05).

Table 2. Comparison of three feeding facility designs at the Opportunities Farm¹

	OS	MON	OPN	SEM	P-value
n (pens)	18	18	18	-	-
Cattle fed, head	1452	1452	1449	-	-
Total morbidity, %	3.5 ^a	5.1 ^{ab}	7.4 ^b	0.94	0.02
Respiratory	1.9 ^a	2.9 ^{ab}	4.9 ^b	0.75	0.03
Foot Rot	1.0	1.1	1.4	0.40	0.75
Lameness	0.1	0.1	0.1	0.04	0.38
Pinkeye	0.5	0.7	0.7	0.21	0.79
Digestive	0.1	0.1	0.2	0.12	0.84
Other	0.2	0.3	0.2	0.16	0.93
Total mortality, %	0.6	0.6	0.8	0.21	0.82
Respiratory	0.1	0.1	0.1	0.08	0.81
Digestive	0.1	0.2	0.4	0.15	0.43
Other	0.4	0.3	0.3	0.12	0.74

¹Analysis completed on common lots that were randomly allocated across the three feeding facilities from 2008 to 2013.

^{a,b}LSMeans within a row with different superscripts differ (P < 0.05).