Comprehensive assessment of feedlot health interventions using outcomes research in a sustainability context

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Background

- Stakeholders are **increasingly** interested in **sustainability** of food production systems
- Sustainability is a balance between environmental responsibility, economic viability, and social acceptability
- Stakeholders need to quantify the **value** of interventions or health management options to enable more informed decisions
- **No standard metric(s) exist to compare sustainability of health or management strategies in a production system**

Objective

Evaluate different antimicrobial use strategies to demonstrate approaches to comprehensively estimate value and assess sustainability

Conclusions

An outcomes research approach may provide a framework to quantify values for **comprehensive assessments** of animal health and management strategies in a sustainability context

Related Paper

Taylor's Contact Info

Comprehensive assessment

Need to consider the "Trade-offs" of sustainability comprehensively

Quantification

As stakeholders increase sustainability terms/goals, the need for an ability to measure change and impacts increases

Value

There are many ways to determine value, and sustainability is another important aspect for stakeholders to consider

Respiratory Disease (BRD) Study

Medium-risk → Metaphylaxis (META) OR Pull & Treat (PT)

Metaphylaxis	BRD	Pull & Treat
Arrival	Tulathromycin	1st pull
1st pull	Florfenicol	2nd pull
2nd pull	Oxytetracycline	3rd pull
3rd pull	Danofloxacin	4th pull

META — Animal well-being (morbidity & mortality)
- 9.9 less BRD cases per 100 animals
- 1.4 less deaths per 100 animals

META — Efficiency & volume of beef production
- 900 kg (~2,000 lb) more carcass per 100 animals

PT — Number of antimicrobial doses used
- ~ 80% fewer antimicrobial doses used for BRD

CO_2e Emissions Estimates [via Elanco's Uplook®]

Data inputs
- Incoming calf
- Animal performance
- Animal health
- Feed
- Utilities
- Water use
- Fuel
- Feedyard management

→ Calculations based on USDA & IPCC greenhouse gas methodologies

Scope 3: Pre-feedyard: Enteric, manure, fuel & electricity; Feed impacts (CO2 + N2O + CH4)

Scope 1 & 2: Feedyard energy use (CO2); Manure (N2O & CH4); Enteric Methane (CH4)

CO_2 e emissions / Live or carcass weight → Metric: kg CO_2 e/ kg LW; kg CO_2 e/ kg CW

CO2e emissions	PT	META	SEM	*P*-value
Pre-feedlot calf footprint, kg CO_2e				
Per animal enrolled	5,859.6	5,862.4	21.24	0.55
Feedlot finishing footprint, kg CO_2e				
Feedlot operations, per animal enrolled	981.0	1,005.6	16.73	0.06
Manure, per animal enrolled	402.5	413.0	6.81	0.09
Enteric methane, per animal enrolled	399.6	410.4	6.52	0.06
Total footprint, kg CO_2e				
Per animal enrolled	7,642.6	7,691.4	33.14	0.08
Per kg final BW	13.66	13.38	0.138	0.09
Per kg HCW	21.20	20.74	0.245	0.10

Economic Estimates

Cost	Revenues
• Feeder purchase price • Feed and yardage • Initial processing • Metaphylaxis • Morbidity • Mortality	• Live sale fed price • Dressed sale fed price • Animals removed from trial

Revenues − Costs = Net Returns

Item, $/animal enrolled	PT	META	SEM	*P*-value
Purchase cost	843.83	845.73	13.75	0.54
Feed and yardage cost	536.21	550.65	8.74	0.06
Cost of gain	81.54	79.79	1.91	0.24
Cost of BRD antimicrobials	5.83	27.18	0.81	< 0.01
Live sale basis revenue	1,290.25	1,322.09	12.67	0.07
Dressed sale basis revenue	1,289.30	1,320.56	16.22	0.12
Net return- live basis	-106.40	-110.30	16.52	0.68
Net return - dressed basis	-107.35	-111.83	20.92	0.71

Outcomes Assessed: Result:

Outcomes Assessed:	Result:
Animal well-being (morbidity & mortality)	META
Efficiency & volume of beef production	META
Number of antimicrobial doses used	PT
Net economic returns (partial budget)	—
Standardized GHG emission (UpLook, Elanco)	META