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Lefapha la Diseanse tsa Bongakadiruiwa

Best of the best of the 2018 Onderstepoort Feedlot Challenge

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The Onderstepoort Feedlot Challenge (OPFLC) is a group based Action Learning Project (ALP) within the Bachelor of Veterinary Science (BVSc) programme of the University of Pretoria (UP) (1-3). Initiated in 2007, the OPFLC maintains its original aims to stimulate interest in production animals through exciting practical exposure; to promote student wellbeing through physical activity and play; to apply "soft" skills such as leadership, communication, business and management skills; and to develop a culture of teamwork, self-learning and critical scientific reasoning amongst future veterinarians(4-7).

The OPFLC uses real cattle, real facilities, real resources, and real problems encountered in a typical feedlot, within a simulated commercial environment. The competition between the participating student groups involves running the most economical and ethically acceptable feedlot from auction to abattoir, and demonstrating evidence of learning (7). Progress is monitored and feedback given continually and students are guided to make evidence based decisions in their daily feedlot management. Small changes are made to the detail of the OPFLC every year to keep it innovative.

The educational success and validity of ALPs in veterinary education have been reported over the past decade and resulted in similar ALPs established within the veterinary curriculum of UP as well as at other institutions (8-12).

Part of the ALP includes an assignment in which each student has to report, based on the individual task assigned, what s/he has learnt during the ALP. Students are encouraged to interpret their own data against existing knowledge to support their findings scientifically. Students are assessed in two phases (first for feedback then for grading) using a predetermined scoring rubric through UP's online learning management system, ClickUP (*Blackboard*®). This document represents the best of the eight OPFLC assignments submitted for each topic in 2018, and serves as an example for future students and to acknowledge excellence.

References

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Group coordinator

Group number: 7 and Task number: 1

Hüster A-M (14061122)

It will be investigated what leadership style was used and whether it was the most appropriate for this project.

The leader created structure in the beginning of the project by creating a *WhatsApp*® group and assigning tasks. Deadlines set out by the feeding roster were strictly enforced. Tasks were assigned according to group members' preferences and members were encouraged to speak up about problems. Decisions were opened up to the group and continuous participation was relied on, eg feedings. The leader was present at major events, eg auction and mixings, to set an example and motivate the team. Towards the end the leader did not interfere with tasks unless specifically asked for guidance.

The autocratic style was used in the beginning to create structure and a task orientated environment (1). Throughout the project the democratic style was used where everyone's opinion was taken into consideration (2). Eventually, the laissez-faire approach allowed for independence because tasks were well understood (3). The situational leadership style is a combination of these three styles (4) and was the main style used (Table 1). This was a successful way of leading because tasks were completed on time and it allowed team members to be creative and honest. Using the autocratic style alone would have created a rigid environment (1), however, using it in the beginning created the set expectations that the leader had from the team – consequently, mixings were attended or a valid excuse was provided. The democratic and laissez-faire approaches resulted in an excellent team spirit and a gradual independence (2). A survey conducted confirmed that the group was content with the leadership attributes used (Table 2 in the addendum).

Table 1

Perceived implementation of leadership styles

Leadership style	Percentage of group members
Autocratic	92%
Democratic	100%
Laissez-faire	100%

In conclusion, the leader succeeded in using the situational leadership style which is considered the ideal (4).

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Addendum

Table 2

Average percentage score given to each leadership attribute of the leader by the group based on perception

Leadership attribute	**Average percentage score (%)**
Effective communication	85
Had mitigation skills and thought of solutions to problems	85
Directive towards certain tasks	80
Assertive and strict	65
Decisive	80
Showed integrity and honesty	96
Consistent	91
Organized	85
Efficient	87
Good grasp of the task at hand	84
Well-informed	91
Had perseverance	93
Showed foresight	80
Available to discuss issues when needed	98
Patient, calm and composed	98
Listened	94
Respected team members	96
Was respected by team members	94
Approachable	96
Trusted team members	95
People skills	92
Motivated team members	85
Provided guidance when needed	84
Open-minded	91
Impartial within the team	91
Compassionate	92
Humble	95
Confident	81

Financial planning and accounting

Group number: 6 and Task number: 2

Lee I M (14103983)

Financial planning is to provide value in knowing what to do with information, allowing a budget to be set up from the start then apply it to obtain a result (1).

A budget for the feed and medication was drawn up to be R29,654.02 and R3,797.59 (Table 3, Table 4). The average daily weight gain calculated to 1.8 kg and a slaughter weight percentage of 60% was used to determine a potential income (3). The budgeted live calf weight per kilogram was R45.00 knowing at the time the dead carcass weight was R40.00 per kg (6, 7). The average weight per calf was 240 kg (5), thus upon calculation less than R8,065.89 per calf should have been spent to reach a profit (Table 1).

Competition amongst peers led to high auction prices and the feed expense went over budget by R7,283.31 (Table 3). A total of R188,800.00 was paid for 14 calves, R13,485.71 per calf (Table 1). The average daily gain 1.53 kg was obtained which was not great enough to compensate for the expenses (Table 2). Although the feed cost was low at this time, R435.67 was saved from the medical expenses and the price for dead carcass per kg increased by R7.50 it all made no difference to the outcome (Table 1). Better disease protocol should have been conducted as the affected calves had a very low average daily gain that led to decrease income (4, Table 2). Considering all other variables, the expense should increase due to overlooked costs such as: veterinary consultations, kraal maintenance, transport, machinery and labour charges (2).

A loss of R59,928.00 was suffered due to poor communication and R4,280.57 per calf was spent over the break-even point (Table 1). This resulted in a higher probability of generating a loss rather than a profit.

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Addendum

Table 1: Financial Planning

	Estimated budget	Calculated results
Cost of live weight calves	R120,988.39/ 15 calves = R8,065.89	R188,800.00 / 14 calves = R13,485.71
Total live weight of calves	240 kg x 15 = 3600 kg	(253 kg x 2) + (258 kg x 2) + (233kg x 2) + (248 kg x 6) + 240 kg + 250 kg = 3466 kg
Total expense at auction	R154,440.00 – R33,451.61 = R120,988.39	(R10,500.00 x 2) + (R11,000.00 x 2) + (R12,000.00 x 2) + (R16,100.00 x 6) + R13,100.00 + R12,100.00 = R188,800.00
Weight gain within 105 days	1.8 kg daily weight gain x 15 calves = 27 kg/ day x 105 days = 2835 kg	5712 kg end weight (abattoir record) – 3466 kg (initial weight) = 2246 kg
Total kg of calves at the end of 105 days	2835 kg + 3600 kg = 6435 kg	5712 kg (abattoir record)
Total dead carcass weight	6435 kg x 60% = 3861 kg	3561,5 kg (abattoir record)
Total income	3861 kg x R40.00/ kg dead carcass weight = R154,440.00	3561,5 kg x R47.50 (abattoir's price) = R169,171.25
Expenses (Feed order + Medication)	R29,654.02 + R3,797.59 = R33,451.61 (initial orders)	R36,937.33 + R3361,92 = R40,299.25
Total income - Cost of calves - Expenses	R154,440.00 – R120,988.39 – R33,451.61 = 0 (break-even point)	R169,171.25 – R188,800.00 – R40,299.25 = (R59,928.00)
Break-even point	R154,550 – R33,451.61 = R120,988.39 / 15 calves = R8,065.89 per calf	R169,171.25 – R40,299.25 = R128,872.00 / 14 calves = R9,205.14 per calf

Table 2: Effects of diseased animals on ADG and selling price

	Number	**Start weight (kg)**	**End weight (kg)**	**Total weight gain (kg)**	**Average daily gain (ADG) (kg)**	**Abnormal/ Normal**	**Selling price/ kg (R47,50)**
	1	248	406	158	1,50	Norm	12088,75
	2	250	426	176	1,68	Ab=Pleuritis (fibrous lung adhesions)	12772,75
	3	253	436	183	1,74	Norm	12820,25
	4	233	383	150	1,43	Norm	11647

	5	248	423	175	1,67	Norm	12791,75
	6	248	397	149	1,42	Norm	11067,5
	7	248	396	148	1,41	Ab= Pneumonia	11547,25
	8	233	389	156	1,49	Ab= Peritonitis	11979,5
	9	253	418	165	1,57	Norm	12359,5
	10	248	409	161	1,53	Ab= Enteritis	11941,5
	11	248	390	142	1,35	Norm	11656,5
	12	258	427	169	1,61	Ab= Severe Pleural adhesions	12540
	13	258	438	180	1,71	Norm	13167
	14	240	374	134	1,28	Lung Adhesions	10792
Total			5712	2246	21,39		169171,25
Average					21,39/ 14 =1,53 kg		

Table 3- Feed expense

	Real cost	**Budget**	**Over budget**
Hominy Chop (R1,65)	14564,55	12540	2024,55
Maize gluten 20 (R2,27)	5216,46	4562,7	653,76
Molasses meal	3300	2800	500
Molasses liquid (R50)	100	100	0
Salt lick blocks	40	20	20
Cattlemaster grower finisher (R206,59)	3305,44	2479,08	826,36
Wheat bran	145	145	0
Whole maize (R155)	6045	4185	1860
Eragrostis-small bales (R45,52)	3140,88	2822,24	318,64
Zilmax (R3,60/g)	1080	0	1080
Total cost	**36937,33**	**29654,02**	**7283,31**

Table 4- Medication expense

	Real cost	**Budget**	**Over budget**
Synovex plus (R25,80)	722,4	774	(51,6)
Botuthrax (R8,88)	124,32	133,2	(8,88)
Lumpy Skin disease (R9,41)	131,74	141,15	(9,41)
Bovishield Gold 5 50 doses (R8,29)	116,06	124,35	(8,29)
One shot ultra 7 (R9,91)	138,74	148,65	(9,91)
Terramycin LA (R2,04 500ml)	714	810,9	(96,9)
Multimin+Se+Cu (R3,93 100ml)	110,04	208,29	(98,25)
Clout (R2,36 1L)	826	938,1	(112,1)
Dectomax Inj solution (R2,73)	191,1	217,04	(25,94)
18G needle (R0,80)	89,6	72	17,6
10ml syringe (R0,95)	5,7	6,65	(0,95)
50ml syringe (R4,40)	0	8,8	(8,8)
Ear tags (R13,52)	189,28	202,8	(13,52)
Latex gloves (R0,53)	0	11,66	(11,66)
20ml syringe	2,94	0	2,94
Total cost	**3361,92**	**3797,59**	**(435,67)**

Selection of calves for profitability

Group number: 4 and Task number: 3

Lichtenberg C H (14075492)

Proper calf selection is of major importance as it is one of the main determining factors for profitability of feedlots (1). There is no fixed recipe for the perfect feedlot calf, since situations are dynamic and differ between feedlots, thus requiring a unique and multifactorial approach.

Prior to the auction the group chose a person whom they deemed knowledgeable and competent regarding this topic. Using scientific articles, research findings and lecture material certain traits and characteristics were identified that, if present, would make a calf desirable to purchase.

The decision was made to attempt to purchase calves of at least 7 months of age (optimum 8-9months old) and an optimum weight of 240kg-250kg (2). Backed by scientific literature the group chose to limit the purchase to male animals, since they tend to have an improved average daily gain (3) and build up fat at a slower rate (4). Once those requirements were met the approach would be to further select for those calves that display a large frame, composition and good muscling that are needed for an animal to thrive in a feedlot (5). Selection of calves with a calm temperament to facilitate easier handling and achieve a better growth (6) were also considered.

People responsible for selecting the calves got to the auction pen an hour before the auction officially started. Thus having time to assess the calves' temperament during offloading (6) and walked through the pens and identify calves desirable to purchase according to the above described criteria. Only male animals were considered (3) and of those the ones with the best phenotype (5) were chosen.

The auction itself however proved fatal. High demand and strong competition between groups caused extremely high prices for the majority of selected calves and the group ended up buying mainly undesirable calves.

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Purchasing of calves at the auction

Group number: 6 and Task number: 4

Glover I G (14013984)

On 9 February 2018 a traditional ascending (1) cattle auction was held. The decision to enter, bid or leave emanated from emotional and social processes (2) with the foundation of past experience.

The whole class attended which led to increased competitiveness and aggressive bidding. This and the perceived probability of winning magnified the "winner's curse" problem; when the winner is likely to be the group that has greatly overestimated the value of the item (2). The plan was to keep bidding as long as the price is lower than the valuation determined beforehand.

Animal characteristics are very important in determining the price (3). Institutional aspects and their effect on prices cannot be ignored (3) and played the biggest role on this day. Halfway through the auction the prices reached an ultimate high; either pay a lot now or even more later. No one wanted to be the last group that needed animals and fall victim to the class' plan to exploit that. This is why it was decided to bid until the bitter end for the batch of 6 calves. Directly after the bid was won, a cutoff price was enforced that was almost R20/kg less than the winning bid. There were records kept to see how many calves each group bought to identify the people that bid just to chase up the price. Two important aspects that greatly contributed to the high prices obtained were the fact that the heterogeneity between the bidders' valuations (4) were very low together with the rule that a minimum of 10 animals had to be bought.

To salvage the group's high rand per kg overall, four more calves were bought at a lower price. This was an unusual auction environment that asked for quick thinking and fast acting.

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Processing logistics: purchasing of consumables, identification, weighing, treatments

Group number: 6 and Task number: 5

Graver N C (14044821)

Processing cattle upon arrival is used to facilitate the transition into the feedlot environment and to safeguard future health and productivity (1). This portfolio entailed the ordering of all vaccinations, growth implants, parasite treatments and ear tags as well as weighing each calf. As the challenge continued, the portfolio included the ordering of treatment drugs if a disease was detected and weighing as a measure of progress.

Bovine respiratory disease contributes to substantial losses in performance, health and carcass quality (2). During processing the respiratory vaccinations included were Bovisheild Gold 5 and One Shot Ultra 7. The Botuthrax vaccine was given as Anthrax vaccinations are required by law. One Shot Ultra 7 was not only included for respiratory disease prevention but also for Clostridial diseases. Lumpy skin disease vaccine was incorporated due to its economic importance - permanent hide damage and debilitating effects resulting in reduced weight gain (3). Multimin was used as a top-up trace mineral support. Terramycin was indicated as a general prophylactic antibiotic. Clout was included for external parasite control and Dectomax for internal and some external parasites (4). Synovex Plus implants were selected to increase weight gain and improve feed efficiency (5). A numbered ear tag was placed in each calf.

Effective processing resulted in none of the cattle contracting any diseases, parasites and deficiencies. The cattle therefore did not require further treatments. This is in contrast to other groups who experienced various problems. During successive weighing, calf 14 acquired radial nerve damage. This highlights the issues experienced when the neck clamp is manned incorrectly and is a concern during processing.

Well implemented processing was essential for the success of the feedlot challenge, without it morbidity and mortalities would increase, and weight gain would decrease.

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Growth implant strategy

Group number: 2 and Task number: 6

Steyn J A (23365677)

The purpose of growth implants in cattle is to increase growth rates, feeding efficiency and carcass quality (1). This report intends to investigate the success of the growth implant strategy used by group 2.

Historical use of trenbolone acetate and estradiol has proven to deliver positive results in the industry by utilising an anabolic function similar to testosterone, and improve appetite and feed conversion ratio (FCR), respectively (1). Lifetime average daily gain (ADG) has proven to be greater in cattle that are implanted on day one after weaning and backgrounding (2) and even greater in cattle that are implanted twice (3). The *Synovex® Plus* product by *Zoetis®* was chosen, a depot capsule containing 200 mg trenbolone acetate and 28 mg estradiol benzoate per implant. Animals were implanted immediately upon arrival following the auction on 9 February 2018. Animals were weighed on 9 February, 3 March, 21 March, during which a second capsule was administered, and again on 25 May before and after slaughter. Both capsules were implanted as approved by the manufacturer (4). On 28 May the ears of all animals were examined and implants were confirmed to be present.

Table 1 contains a recording of the ADG, FCR and dressing percentage (DP) of all animals on day 105. In comparing the values in table 1 with the reference values in table 2, the acquired ADG values are on par with expected results for implanted cattle. The acquired FCR and dressing percentages are lower than expected (2).

Table 1: Acquired values of animals and carcasses upon slaughter

	Auction Weight (kg)	Slaughter Live Weight (kg)	Weight Gain (kg)	ADG (kg)	Warm Mass (kg)	Cold Mass (kg)	DP (%)
Total	2287,1	4003	1715,9		2574,0	2497	
Average	254,1	444,8	190,7	1,8			62,53
FCR			6,4				

Table 2: Reference values (2)

	ADG (kg)	FCR	DP (%)
No implant	1.65	5.71	63.5
Early implant	1.72	5.41	64.1
Delayed implant	1.73	5.35	64.3

ADG corresponded favourably to expectations. FCR and DP were low, suggesting that feeding efficiency and carcass quality were sub-par. Other environmental and management factors may influence carcass quality and production efficiency (5). Due to the shortcomings of this investigation, a control group is needed to further investigate the influence of these factors.

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Other growth stimulant strategy

Group number: 4 and Task number: 7

Hall J M (14047986)

Zilpaterol hydrochloride and monensin were included in the cattle's ration to provide additional growth stimulation.

Monensin was included in the ration throughout the feeding period of 105 days. It supports growth by altering rumen microbial populations (1), leading to greater carbon and nitrogen retention, increasing feed efficiency (2). It was contained within a ready-made premix that was added to the feed during mixing.

Zilpaterol hydrochloride is a beta-2 adrenergic agonist. It acts as repartitioning agent, reducing fat deposition and increasing protein synthesis, leading to greater carcass muscling and increased carcass weight (3). Studies have shown an increase in warm carcass weight by on average 15 kg (4). It was fed for a total of 37 days with a three day withdrawal before slaughter. It was mixed into the ration at a concentration of 5,8 g per ton (120 g of a 4,8% zilpaterol hydrochloride powder per ton). Nitrile gloves were used during handling to prevent transdermal absorption. With cattle eating on average 11,5 kg per day (14 cows received 160 kg of feed per day), each animal was provided with a daily dose of at least 66 mg of zilpaterol hydrochloride. Feed was mixed for, on average, 20 minutes to ensure equal distribution of the growth promotion agents.

At slaughter the cattle achieved relatively uniform weights (table 1), indicating equal distribution of the growth promoting agents within the feed. On average, the cattle achieved a feed conversion ratio of 6:1 and average daily gain of 1.6 kg/day (table 2). These values are comparable to commercial feedlots in South Africa (5). The carcasses received A2/A3 grades, indicating optimal fat coverage (table 2).

In conclusion, monensin helped to optimize feed efficiency of the cattle and zilpaterol hydrochloride helped in achieving optimal growth of the animals and fat coverage of the carcasses.

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Table 1: Warm carcass weights of 14 cattle.

Identification number	Warm Carcass Weight (kg)
1	260,6
2	255.2
3	277.6
4	291.6
5	277.4
6	270.6
7	252
8	258.4
9	239.2
10	270.2
11	281.2
12	270.6
13	274.2
14	260.2
Average	267.1

Table 2: Initial weight, final weight, grade, average daily gain and feed conversion ratio of 14 cattle.

Identification Number	Initial weight (kg)	Final weight (kg)	Grade	Average daily gain (kg/day)	
1	232.0	397.0	A2	1.57	
2	228.0	400.0	A2	1.64	
3	267.0	423.0	A2	1.49	
4	268.0	450.0	A2	1.73	
5	230.0	423.0	A2	1.84	
6	248.0	426.0	A2	1.70	
7	259.0	396.0	A3	1.30	
8	252.3	415.0	A2	1.55	
9	245.0	372.0	A2	1.21	
10	256.0	412.0	A2	1.49	
11	251.0	445.0	A2	1.85	
12	233.5	407.0	A2	1.65	
13	277.0	435.0	A3	1.50	
14	260.0	421.0	A2	1.53	
				Average	1.6
				Feed conversion ratio (Daily feed consumption /Average daily gain)	11.5/1.6= 6:1

Ration Formulation

Group number: 3 and Task number: 8

Walton R A (14060168)

When it comes to ration formulation, Gluten 20 is often used as a feed component. In this report, the reasoning behind selecting dried brewers' grain over Gluten 20 will be investigated.

As stipulated in the formulation guidelines provided for the 2018 feedlot challenge, rations formulated for the project were relatively in line with the margins provided (see Addendum A). Hominy chop and *Eragrostis* grass are easily fed in various ratios to achieve appropriate growth without negative effects (1). The starter ration contained brewers' grain which decreased slightly over the various rations whilst only using wheat bran in the starter ration (see Addendum B, C and D).

According to Rod Preston Feedstuff Values (see Addendum E) and current research conducted; dried brewers' grain is approximately 4% higher in TDN (Total Digestible Nutrients) as compared to Gluten 20. The NEm (Net Energy for maintenance) and NEg (Net Energy for gain) is also substantially greater along with the UIP (Undegradable Intake Protein). This allows for a hotter ration in the short period provided (ie shorter than normal) along with a higher fraction of CP (Crude Protein) escaping the digestion of rumen microbes. This increased by-protein product, compared to Gluten 20, allows for more anabolic protein available for the body; to increase body mass over a shorter period of time. Dried brewers' grain is an excellent feed as it can be combined with inexpensive NPN (Non-Protein Nitrogen) sources to provide all the essential amino acids (2).

In the real world, dried brewers' grain is cheaper than Gluten 20. The ration formulated was hotter than usual but the particle size was not too fine and thus grass was only added over a three day period of high acidosis risk. This ration contributed to winning the on-hoof evaluation and the above research supports the opening statement.

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2. Mussatto S I, Dragone G, Roberto I C 2006 Brewers' spent grain: generation, characteristics and potential applications. *Journal of Cereal Science* 43: 1-14.
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Addendum A- Ration formulation guidelines provided 2018

	Units	Starter	Grower	Finisher
TDN	%	55-65	70-75	78-80
ME	Mcal/MJ/kg	2.5-2.7	2.7-2.8	2.9-3
NEg	Mcal/MJ/kg	1.1-1.2	1.25-1.30	1.30-1.35
NEm	Mcal/MJ/kg	1.6-1.8	1.8-2.0	2.0-2.1
Crude Protein	%	14-16	13-14	12-14
Urea (NPN)	%	0.5-1.0	0.5-1.0	0.8-1.2
DIP/CP	%	60-65	65-70	65-75
UIP/CP	%	35-40	30-35	30-35
Roughage/eNDF	%	12-16	8-10	8-10
CF	%	10-14	8-10	8-10
Ca	%	0.8-1.2	0.8-1.2	0.8-1.2
P	%	0.4-0.5	0.4-0.5	0.4-0.5
S (Max)	%	0.2	0.2	0.2
Vit A	IU/kg	4000-6000	4000	2000-4000
Vit E	Mg/kg	20	20	20
Zn	Mg/kg	60-80	60-80	60-80
Se	Mg/kg	0.3	0.3	0.3
Ionopore	Mg/kg	20-25	30-35	30-40

Addendum B- Starter ration

	01/00/00	FEEDLOT	STARTER																
	INGREDIENT	AS IS	DM	DM %	PROT	FIBER	RF	NEm	NEg	Ca	Monensin	FAT	K	SALT	P	COST	PRICE	NDF	UIP
11	HOMINYCHOP	470.00	411.25	46.03	5.06	4.21	0.00	1.06	0.73	0.02	0.00	4.49	0.27	0.00	0.27	746.36	1588.00	0.00	2.68
6	GLUTEN 20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		705.00	0.00	0.00
19	WHEAT BRAN	100.00	90.00	10.07	1.71	1.05	0.00	0.19	0.13	0.01	0.00	0.36	0.12	0.00	0.09	162.10	1621.00	0.00	0.34
7	GRASS	85.00	76.50	8.56	0.56	3.25	8.56	0.09	0.04	0.01	0.00	0.34	0.01	0.00	0.01	0.00	0.00	0.00	0.17
22	LUSERN	70.00	63.00	7.05	1.13	2.40	5.29	0.08	0.03	0.08	0.00	0.02	0.14	0.00	0.02	0.00	0.00	0.00	0.27
54	Brewersgrain	160.00	147.20	16.46	3.19	1.15	0.00	0.33	0.22	0.03	0.00	0.45	0.02	0.00	0.09	0.00	0.00	0.00	43.07
0		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
24	MOLASSES MEAL	80.00	70.40	7.88	0.35	0.00	0.00	0.14	0.09	0.04	0.00	0.00	0.03	0.02	0.01	119.60	1495.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
53	SARTER MACRO PACK	35.00	35.00	3.92	2.28	0.00	0.00	0.00	0.00	0.92	29.71	0.00	0.02	0.16	0.05	63.13	1803.58	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
	TOTAAL	1000.00	893.35	89.34	14.28	12.06	13.85	1.88	1.24	1.12	29.71	5.66	0.61	0.17	0.54	1091.19	7212.58	0.00	46.53
			PRICE	AS IS	1091.19	DM	1221.45												

Addendum C- Grower ration

	01/00/00	FEEDLOT	STARTER																
	INGREDIENT	AS IS	DM	DM %	PROT	FIBER	RF	NEm	NEg	Ca	Monensin	FAT	K	SALT	P	COST	PRICE	NDF	UIP
11	HOMINYCHOP	620.00	542.50	61.07	6.72	5.58	0.00	1.40	0.96	0.03	0.00	5.96	0.36	0.00	0.36	984.56	1588.00	0.00	3.56
6	GLUTEN 20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		705.00	0.00	0.00
19	WHEAT BRAN	50.00	45.00	5.07	0.86	0.53	0.00	0.09	0.06	0.01	0.00	0.18	0.06	0.00	0.05	81.05	1621.00	0.00	0.17
7	GRASS	100.00	90.00	10.13	0.66	3.85	10.13	0.10	0.05	0.02	0.00	0.41	0.01	0.00	0.01	0.00	0.00	0.00	0.20
22	LUSERN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
54	Brewersgrain	120.00	110.40	12.43	3.10	1.70	0.00	0.25	0.17	0.04	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.00	41.85
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
24	MOLASSES MEAL	80.00	70.40	7.93	0.36	0.00	0.00	0.14	0.09	0.05	0.00	0.00	0.03	0.02	0.01	119.60	1495.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
53	SARTER MACRO PACK	30.00	30.00	3.38	1.96	0.00	0.00	0.00	0.00	0.79	25.61	0.00	0.01	0.14	0.05	54.11	1803.58	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
	TOTAAL	1000.00	888.30	88.83	13.66	11.66	10.13	1.99	1.33	0.94	25.61	6.55	0.49	0.15	0.54	1239.32	7212.58	0.00	45.78
			PRICE	AS IS	1239.32	DM	1395.16												

Addendum D- Finisher ration

	01/00/00	FEEDLOT	STARTER																
	INGREDIENT	AS IS	DM	DM %	PROT	FIBER	RF	NEm	NEg	Ca	Monensin	FAT	K	SALT	P	COST	PRICE	NDF	UIP
11	HOMINYCHOP	720.00	630.00	69.71	7.67	6.37	0.00	1.60	1.10	0.03	0.00	6.80	0.41	0.00	0.41	1143.36	1588.00	0.00	4.06
6	GLUTEN 20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		705.00	0.00	0.00
19	WHEAT BRAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		1621.00	0.00	0.00
7	GRASS	70.00	63.00	6.97	0.45	2.65	6.97	0.07	0.03	0.01	0.00	0.28	0.01	0.00	0.01	0.00	0.00	0.00	0.14
22	LUSERN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
54	Brewersgrain	100.00	110.40	12.22	3.10	1.70	0.00	0.25	0.16	0.04	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.00	41.85
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
24	MOLASSES MEAL	80.00	70.40	7.79	0.35	0.00	0.00	0.13	0.09	0.05	0.00	0.00	0.03	0.02	0.01	119.60	1495.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
53	SARTER MACRO PACK	30.00	30.00	3.32	1.93	0.00	0.00	0.00	0.00	0.78	25.17	0.00	0.01	0.13	0.05	54.11	1803.58	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
	TOTAAL	1000.00	903.80	90.38	13.50	10.72	6.97	2.06	1.39	0.91	25.17	7.08	0.48	0.15	0.54	1317.07	7212.58	0.00	46.05
			PRICE	AS IS	1317.07	DM	1457.26												

Addendum E- Rod Preston feedstuff values

FEEDSTUFF	DM %	TDN %	NE_m (Mcal/kg.)	ME	NE_m	NE_g	NE_g	NE_l	NE_l	NFC %	CP %	UIP %CP	UIP %	CF %	ADF %	NDF %
Corn Gluten Feed	90	80	86	2.89	1.89599	56	1.2346	83	1.82985	30.8	22	25	5.5	9	12	38
Brewers Grains Dried	92	84	92	3.04	2.02826	61	1.34483	87	1.91803	12.5	25	54	13.5	14	24	49
Brewers Grains Wet	23	85	93	3.07	2.05031	62	1.36687	88	1.94008	15.5	26	52	13.52	13	21	45
Wheat Bran	89	70	73	2.53	1.60938	44	0.97004	71	1.56529	26.6	17	28	4.76	11	14	46

Feed store management

Group number: 5 and Task: 9

Van der Merwe C (14093792)

After mixing, feed components must be stored correctly as nutrient loss and feed damage are influenced by storage conditions, subsequently affecting animals (1). Therefore, feed store management and evaluation is important in a feedlot setting.

A checklist was designed to log amount of feed given and thrown away daily (Table 1, Image 1). Values entered were determined by weighing the feed. Feed quality was routinely monitored via visual inspection (eg for presence of mould) and physical handling. The allocated bay had palisade fencing which posed a challenge in protecting feed against environmental elements and bags were stacked against the fence to create a buffer against these elements.

For the majority of the challenge, 120 kg feed was fed daily with 228.5 kg wastage in total. The checklist worked well as feed intake and amount of feed left was calculated and potential problems identified, aiding continual and accurate record keeping thus simplifying management. Feeding times were also monitored and it was found that the cattle were fed at the same time each day. This reduces the incidence of digestive upsets (2). On inspection, feed quality was satisfactory with no contamination with wildlife excreta, which is associated with diseases such as *Salmonella* (3). Concerning the self-constructed buffer, owing to high rainfall during March, five 20 kg feed bags were thrown away due to presence of mould, leading to economic losses. Mouldy feed may have adverse effects on feed intake, performance and health of animals (4). Recommendations would include sealing off exposed feed store walls to prevent damage of feed by environmental elements, if the challenge could be repeated, more permanent methods and materials would be used to achieve this.

Briefly, the management of the feed store, although challenging at times, was largely successful and played a vital role in the Feedlot Challenge.

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3. Daniels M J, Hutchings M R, Greig A 2003. The risk of disease transmission to livestock posed by contamination of farm stored feed by wildlife excreta. *Epidemiol. Infect.* 130: 561-568.
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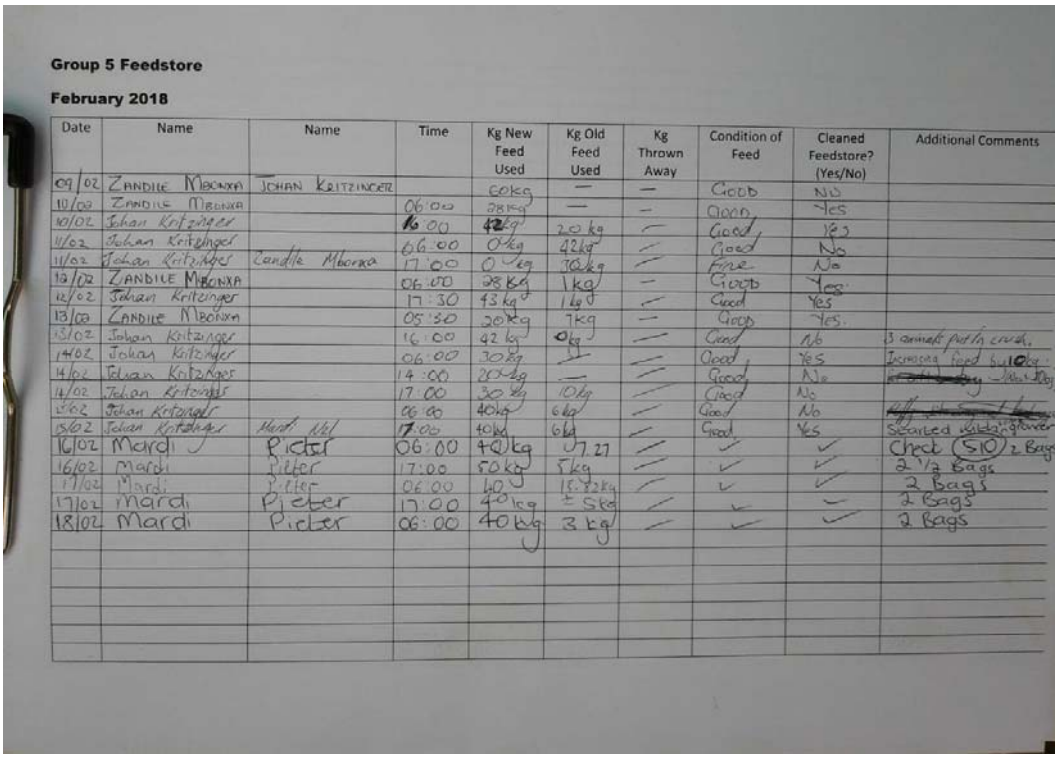
Table 1: Example of Electronic Checklist Table Used to Monitor Feed Intake, Feed Store and Feed Quality

Date	Student 1	Student 2	Time	Kg New Feed Used	Kg Old Feed Used	Kg Feed Thrown	Condition of Feed?	Cleaned Feed store?	Additional Comments
eg 01 Feb	Student X	Student Y	06:00	40kg	10kg	0kg	Good	Yes	None

Image 1: Example of Written Entries for the Checklist



Group 5 Feedstore

February 2018

Date	Name	Name	Time	Kg New Feed Used	Kg Old Feed Used	Kg Thrown Away	Condition of Feed	Cleaned Feedstore? (Yes/No)	Additional Comments
09/02	Zandile Mbonxa	Johan Kritzinger		50kg	—	—	Good	No	
10/02	Zandile Mbonxa		06:00	38kg	—	—	Good	Yes	
10/02	Johan Kritzinger		16:00	42kg	20 kg	—	Good	Yes	
11/02	Johan Kritzinger		06:00	0kg	42kg	—	Good	No	
11/02	Johan Kritzinger	Zandile Mbonxa	17:00	0 kg	30kg	—	Fine	No	
12/02	Zandile Mbonxa		06:00	28 kg	1 kg	—	Good	Yes	
12/02	Johan Kritzinger		17:30	43 kg	1 kg	—	Good	Yes	
13/02	Zandile Mbonxa		05:30	20kg	7kg	—	Good	Yes	
13/02	Johan Kritzinger		16:00	42 kg	0kg	—	Good	No	3 animals put in crush.
14/02	Johan Kritzinger		06:00	30kg	11	—	Good	Yes	Increased feed by 10kg.
14/02	Johan Kritzinger		14:00	20kg	—	—	Good	No	[redacted]
14/02	Johan Kritzinger		17:00	30 kg	10kg	—	Good	No	
15/02	Johan Kritzinger		06:00	40kg	6kg	—	Good	No	[redacted]
15/02	Johan Kritzinger	Mardi Nel	17:00	40kg	6kg	—	Good	Yes	Scanned Kitzinger Grower
16/02	Mardi	Pieter	06:00	40kg	7.27	—	✓	✓	Check (510) 2 Bags
16/02	Mardi	Pieter	17:00	50kg	5kg	—	✓	✓	2 1/2 Bags
17/02	Mardi	Pieter	06:00	40	15.82kg	—	✓	✓	2 Bags
17/02	Mardi	Pieter	17:00	40kg	± 5kg	—	✓	—	2 Bags
18/02	Mardi	Pieter	06:00	40 kg	3 kg	—	✓	✓	2 Bags

Bunk management

Group number: 4 and Task number: 23

Smith A D (11090945)

Stress influences the release of factors detrimental to rumen function and health, making animal well- being during cattle handling and interaction a primary concern (1). Since bunk management and feed delivery constitute most frequent and consistent periods of contact, these recurring windows represent critical application time for pre-emptive monitoring and maintenance.

While the most readily controlled among variables, are arguably feeding schedule and frequent TMR push-up (2), feeders are also faced with challenges including bunk competition, intake monitoring, spoilage with refusal and inclement weather, uneven feed delivery and potential foreign contaminant ingestion (3).

Studies show markedly differing intake patterns among communally penned individuals (4,5). This was a clearly perceived uncontrolled variable, especially given the mixed nature of the group; however, daily observation allowed keen vigil over particular individuals for signs of foreign body obstruction, rumen atony or traumatic reticuloperitonitis. Feeding and yard inspections were conducted quietly and without undue contact or sudden movement. This was done consistently to establish a routine. Regular inspection was aimed at avoiding spoiled feed and hazardous materials like twine and wire. A salt lick block was added to decrease bulling behavior around the bunk. Bunk scores were continuously recorded along with individual observations. Uniform feed delivery was manually achieved by the attentive feeder.

Daily inspection yielded various pieces of metal, wire, cigarette stumps and inorganic refuse. Dead pigeons occasionally showing signs of being chewed on were also removed from the yard during Zilmax- containing ration periods. Zero cases of disease relating to foreign body consumption were documented and cattle adjusted well to frequent periods of contact as evidenced by decreasing flight zone size. Less bulling was observed following the addition of salt lick and timid individuals were seen feeding more confidently over time.

Minimally stressful monitoring and bunk management contributed to disease prevention and rumen function and -health of feedlot cattle.

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Kraal management

Group number: 7 and Task number: 10

Engelbrecht N C M (14029414)

The main focus of the approach to kraal management was the cleaning of the water trough. Cleaning during the feedlot challenge was done weekly at first. But it was altered to rather use the assessment of algae buildup in the water and on the inner sides of the water trough as indicator for when the trough required to be cleaned.

During the time of the feedlot challenge a wide variety of weather was experienced, including a week long rainfall period. Therefore the cleaning interval was rather subjectively approached. It was noted that the growth of algae was considerably reduced with overcast conditions and rainfall. Sunlight as well as higher ambient temperatures encourages algae growth (1). Cattle exposed to higher temperatures consume up to double the amount of water they consume with lower temperatures (2). Summer conditions causes a higher concentration of *Escherichia coli* and other coliform bacteria in the water (3). Increased comsumption causes more contamination of the water trough through the food particles and saliva left behind in the water by the animals, as observed during this year's feedlot challenge. In a study done by LeJeune et al it was shown that water troughs placed closer to the feedbunk had higher *Escherichia coli* counts (3). This type of contamination decreases the water palatability. Cattle have the ability to distinguish between water of different taste and quality (4). This can influence their performance as water consumption is correlated with feed intake (5).

This indicates that the placement of water troughs under shade would be more ideal to ensure less algae growth and better quality for good palatability to keep the water intake as high as possible.

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Disease monitoring from birth to large girth in fourteen feedlot cattle

Group number: 4 and Task number: 11

Venter C (13162684)

Disease monitoring in a feedlot is defined by the continuous efforts aimed at evaluating the health and disease status of these animals (1). This is particularly important because early disease detection decreases mortality rates (2).

In order to maintain successful monitoring, a disease monitoring sheet was designed that contained 14 different categories of signs to look out for in the cattle (addendum A). The sheet was completed on three different occasions per day for the duration that the cattle were in the feedlot. The objectives of this close monitoring were to reduce the morbidity and mortality rates and to minimize expenditure on pharmaceuticals, maximising profits in an industry with very narrow profit margins. (3). Had an animal presented with disease symptoms, the necessary disease protocol would have been implemented.

In March, feedlot groups were alerted that signs of mild acidosis had been noted among the cattle. Although changes were not noted within our lot, extra roughage was provided as a prophylactic measure. In April, calf 402 was identified during feeding using the disease monitoring sheet due to regurgitation of green, undigested food. Consultation with Professor Prozesky revealed that this was non-pathological. When the roughage in the diet is insufficient, cattle eructate too fast and in the process their mouths cannot close fast enough resulting in undigested feed being expelled from the oral cavity (4,5), as seen in figure 1.

Since the post mortem evaluation of the cattle showed various lesions including rumen stars, pleural adhesions and liver abscessation; it can be concluded that even good disease monitoring does not guarantee freedom from disease. Lesions indicate respiratory disease as well as rumen acidosis and these contribute to economic losses in the feedlot setting (6).

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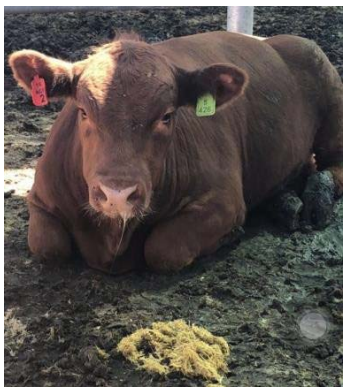
Addendum A

What to look out for in our feedlot cattle.

If anything abnormal is noted please message me (Carisa) immediately at 083 417 2226

Date 18/04/2018	6AM	1 PM	6 PM	If present, please indicate the affected animal's number
Respiratory rate (Normal : 12-20 breaths/ min) Normal breathing pattern (Panting ? –> take time of day & temperature into consideration.)	✓	✓	✓	normal
Nasal discharge ➢ Large amount of clear mucus. ➢ Any discoloured mucus.	×	✓	✓	413, serous nasal discharge, resolved at 1 p.m.
Excessive salivation	✓	✓	✓	normal
Pustules in the nares Open mouth breathing Dyspnoea	✓	✓	✓	normal
Any sign of depression ➢ Isolated ➢ Droopy ears ➢ Head hanging down ➢ Not moving towards the feed. ➢ Not standing up when you walk towards it. ➢ Not grooming itself	✓	✓	✓	All 14 cattle immediately came to eat on all 3 feeding session
Look for absence or rumen movements (rumen fill, if cow is actively ruminating etc)	✓	✓	✓	All cattle are actively ruminating.
Any sign of bloat. ➢ Look carefully at the left paralumbar fossa.	✓	✓	✓	normal
Swelling of the limbs / joints , lameness, animals standing oddly for example leaning backwards or constantly shifting their weight from foot to another. Over knuckling at the fetlocks	✓	✓	✓	normal
Lacrimation , obvious inflammation of the eye, pink/ red appearance of the eye which become opaque.	✓	✓	✓	normal
Skin lesions	✓	✓	✓	Still some dermatophilosis present.
Any lumps (if present please describe position & approximate size ie golf ball, orange etc.)	✓	✓	✓	Some small vaccine reaction on 406 & 408
Consistency and colour of faeces	✓	✓	✓	normal
Vulvar / rectal prolapse	✓	✓	✓	No abnormality
Nervous symptoms ➢ Hyperaesthesia ➢ Exaggerated blinking ➢ High stepping gait ➢ Pedalling ➢ Opisthotonus ➢ Convulsions ➢ Circling ➢ Head pressing	✓	✓	✓	normal

Figure 1



(Photo courtesy of J Morris)

Minimizing the “carbon footprint” of beef production

Group number: 6 and Task number: 12

Krügel A (14014964)

The carbon footprint has become a household term with disproportionate scrutiny placed on the contribution of the agricultural sector (especially beef production) (1). The feedlot challenge provided a practical research opportunity into the industry’s contribution.

Firstly, the source of carbon emissions in beef production and how this can be decreased, or at the very least, better managed had to be determined. A major contributor is enteric fermentation; where feed is broken down by microbes in the rumen to produce methane gas (2). Many factors such as level of feed intake, type of carbohydrate in the diet, feed processing, addition of lipids or ionophores to the diet and alterations in the ruminal microflora influence methane emissions from cattle (3). Research conducted led to the conclusion that by improving feed efficiency, methane production can be decreased. The next area where carbon emissions could be controlled was through manure storage (for fertilizer production) or treatment (for composting). Predicting the quality and quantity of manure production was difficult, thus a theoretical plan to decrease the feedlot’s carbon footprint was drawn up.

The plan was to find a fertilizer company to buy our manure as another source of income, or alternatively try composting. Unable to find a buyer, composting was the consequent choice. Unfortunately in this feedlot setting, it was not a viable option. For the best quality end result a variety of materials and a balanced carbon to nitrogen ratio is required (4). This would not have been the case and the possibility of further carbon emissions was too great.

Although composting was not successful in this feedlot setting, larger feedlots, with increased manure production and possible addition of other materials or composting facilities could have a greater chance of success in decreasing the carbon footprint.

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Monitoring feed intake

Group number: 3 and Task number: 13

Louw S E (10514989)

In the author's opinion, monitoring feed consumption is important in reference to tracking performance and success of a beef feedlot. Consumers demand a consistent supply of beef in both quantity and quality (1).

According to the SA Feedlot Association, production parameters for a feedlot include - Entry mass: 230 kg, Exit mass: 460 kg, and Feed consumed: 12.5 kg/day (5). Feed consumption is usually 2.5-3% of body weight (1). With these parameters in mind, a feeding schedule was created.

There are various ways in which to record feed consumption. Our intake measurements are based on pen – fed cattle and therefore are average measurements (2). Feed delivered and feed refused (prior to 6 am meal) was weighed and recorded daily to determine the average pen consumption (6). Weekly reports on consumption were submitted to our lecturers.

Week 1 (Starter ration) the overall average for feed delivered was 94 kg and feed consumed was 77.14 kg. The daily feed intake was 7 kg. Week 2 (Grower ration) the overall average for feed delivered was 116 kg and feed consumed was 111 kg. The daily feed intake was 16 kg. Week 3 (Finisher ration) the overall average feed delivered was 113 kg and feed consumed was 113 kg. The daily feed intake was 16 kg. It is important to note that feeding a constant amount of feed every day does not eliminate day-to-day variations in feed consumption (4). Refer to Addendum A for feed intake table.

Numerous factors can influence feed consumption such as: environmental changes, sudden diet changes, signalment, stressors, growth implants, social hierarchy, or debilitating diseases/conditions related to the gastrointestinal or respiratory tract (3). For managerial purposes, it is important to monitor feed intake to eliminate external factors that cause a reduction in feed intake and hinder performance.

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Management of lameness

Group number: 2 and Task number: 14

Mathee N (14007216)

Lameness in feedlot cattle is most often caused by laminitis as a result of a diet too high in concentrates, however it can also be due to other injuries. Feedlot injuries are often overlooked or misdiagnosed (1). Lameness leads to a reduced average daily gain and subsequently reduced profit (2).

All cattle were fed a predetermined ration twice daily and observed for signs of lameness, namely difficulty walking or favouring a specific leg (3). Two out of 10 steers suffered from lameness, both cases being unrelated to the ration. One had a coxofemoral subluxation and the other permanent carpal cartilage damage. They were separated from the rest of the herd to prevent further injury, and ate less than their herd mates who were unaffected.

Lameness resulted in reduced performance as the steers were reluctant to eat or approach the feed bunk, resulting in reduced weight gain (4). Upon weighing, both steers in the hospital pen's average daily gain dropped significantly after the injury occurred. Number 6's average daily gain decreased from 3.2 to
1.9 and number 10's decreased from 2.1 to 1.2 within 18 days (please see Table 1 attached). Apart from the profit loss due to poor average daily gain, the necessary pain medication incurred more unnecessary costs, and further reduced the profit. Atrophy of muscle mass due to the lameness and disuse of the affected limb lead to an overall lower carcass mass at slaughter compared to other steers without lameness.

It can be concluded that lameness in a feedlot leads to a reduced average daily gain impacting on the final slaughter weight and subsequently results in a loss of potential profit.

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Table 1

Ear-tag ID	Weight on day of auction 9 February (kg)	Weight on 3 March (kg)	Average daily gain (ADG) (kg)	Weight on 21 March (kg)	Average daily gain (kg)
G2-1	265.7	330.5	2.9	369.0	2.1
G2-2	292.5	331.0	1.8	372.0	2.3
G2-3	228.6	285.8	2.6	329.0	2.4
G2-4	216.6	277.2	2.8	302.0	1.4
G2-5	281.8	336.4	2.5	366.0	1.6
G2-6	**247.6**	**317.6**	**3.2**	**333.0**	**0.9**
G2-7	246.2	300.3	2.5	347.0	2.6
G2-8	247.8	286.9	1.8	343.0	3.1
G2-9	246.0	298.1	2.4	347.0	2.7
G2-10	**261.9**	**308.8**	**2.1**	**331.0**	**1.2**

Management of clostridial myositis and lameness

Group number: 1 and Task number: 14

Krause J G (14103852)

Lameness in cattle can decrease overall performance leading to economic losses as well as presenting a welfare issue, and must therefore be managed effectively (1). Footrot is considered to be one of the most common causes of lameness in feedlot cattle (1), with other diseases of concern being clostridial myositis, laminitis following acidosis and septic arthritis (2).

Cattle were observed twice a day to detect lameness and evaluated based on gait and posture (3). Disease protocols were drawn up to have a guide on how to recognise and treat diseases of concern. One Shot Ultra® 7 was used to vaccinate against clostridial diseases.

Three cattle showed signs of lameness at the beginning of April. This was ascribed to an outbreak of bovine ephemeral fever due to consistency with the disease's clinical signs (4). Cattle were sprayed to reduce midge bites (4) and recovered without treatment. Shortly after, one heifer was observed to be lame and when the condition did not resolve spontaneously within a few days she was pulled and observed. A diagnosis of interdigital phlegmon (footrot) was made based on appearance, lesion location, and degree of lameness. The condition was treated with a three-day course of Excenel RTU® and one dose of Rimadyl (carprofen) as well as thorough cleaning of the foot and wound.

All cases of lameness resolved with the treatment and ancillary measures applied. The footrot case was likely due to the muddy conditions following a spell of heavy rains. Maceration of the skin allowed for entry of pathogenic bacteria such as *Fusobacterium necrophorum* (5).

With appropriate monitoring and treatment protocols, lameness cases can be efficiently handled with minimal losses. Being able to recognise and treat the common causes of lameness in feedlot cattle is essential for good management practice.

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Management of bovine respiratory disease

Group number: 4 and Task number: 15

Janse van Rensburg M (14088322)

Bovine respiratory disease (BRD) is the main cause of mortality, reduced average daily gain (ADG) and an incidence of 52% is reported in South African feedlots in high risk periods (1). Strategies to reduce the incidence of BRD include preconditioning, vaccination and metaphylactic therapy (2). Metaphylactic therapy is associated with increased antimicrobial resistance (3).

Preconditioned vaccinated cattle were bought at an auction and transported to the feedlot. Stressors, such as transport can lead to an increased risk of BRD (2). Upon arrival cattle were given a booster vaccination with a modified live vaccine (Bovi-Shield Gold 5®, Zoetis South-Africa) against the most common viral etiologies and an inactivated vaccine (One Shot Ultra 7®, Zoetis South Africa) against bacterial etiologies associated with BRD (4). Cattle were classified as having a moderate risk of developing BRD based on previous reports (5) and metaphylaxis with oxytetracycline (Terramycin LA®, Zoetis South Africa) was given accordingly. Close daily monitoring of cattle for early BRD detection was implemented.

No cattle were pulled for clinical BRD during the 105 days of feeding, however it is known that pulling is not an accurate indicator of BRD (1). At slaughter four cattle (28,6%) had two or less lung- to-lung adhesions, however this was not associated with growth rate (mean ADG 1.84 kg and 1.81 kg in affected and unaffected calves respectively) and it can be assumed that these lesions occurred before cattle arrived at the feedlot (1).

In retrospect, the cattle were not fed in a high-risk period, were preconditioned and vaccinated therefore had a low a risk of developing BRD (2). Previous reports indicate some incidence of BRD despite metaphylaxis (5).

It can be concluded that the risk for and incidence of BRD during the feeding period was low, and that the use of metaphylactic therapy was therefore not justified.

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Management of clostridial myositis and lameness

Group number: 8 and Task number: 16

Murray L K (14071852)

Clostridial myositis and lameness remain important potential causes of morbidity, and thus of economic losses, in feedlot cattle in South Africa (1 and 2). It is therefore critical to manage these conditions through adequate prevention, diagnosis, and where appropriate, treatment.

Clostridial myositis is principally prevented through vaccination (3). During feedlot processing, group eight vaccinated with One Shot Ultra 7®. This was the cattle's second dose, following a primary vaccine during backgrounding (4). Lameness, conversely, was prevented through good animal handling (5). However, during an outbreak of bovine ephemeral fever (BEF), the steers were also sprayed with Decatix 3®. The diagnostic plan for both clostridial myositis and lameness involved establishment of a disease protocol. Furthermore, the group monitored the cattle thrice daily with the aid of monitoring sheets. During monitoring, steer 8-07 presented with lameness and was subsequently diagnosed with left hindlimb digital dermatitis (4 and 6). The treatment plan was based on the aforementioned disease protocol. The animal was given Rimadyl® as well as Excenel®, and the wound was flushed, cleaned, and sprayed with Supona® (4 and 7).

None of group eight's steers contracted clostridial myositis, suggesting that the vaccination protocol was effective or that there was no challenge. During the BEF outbreak, the group's morbidity was 0%, thus the Decatix 3® effectively repelled *Culicoides spp.* and mosquitoes (8). Steer 8-07's lameness may have been prevented by better drainage of the camps (7). The steer showed no signs of lameness within two days, suggesting that both our diagnosis and choice of treatment were adequate. However, the use of a systemic antibiotic was likely an unnecessary cost (9).

Lameness was thus unsuccessfully prevented by group eight. However, steer 8-07's response to treatment suggested that diagnosis and treatment were effective. Nevertheless, the group should not have used systemic antibiotics in this case.

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Management of gastro-intestinal disorders

Group number: 4 and Task number: 16

Harris S B (14104492)

Digestive disorders account for approximately 30% of deaths in feedlot cattle and contribute to decreased performance and production (1). Ruminal bloat and acidosis represent the most common disorders thus, clinical signs such as abdominal distention and reduction in feed intake were monitored timeously (2).

Daily records of feed intake, behaviour and faecal presentation aided in the detection of abnormalities. At 06:00 on 28 February, a drastic reduction in feed intake was detected. There were six times more feed left in the bunk supported by an increased bunk score from one to four compared to the average of the previous week. Multiple stools of grey (Fig. 1) and slimy (Fig. 2) faeces were found. These findings are typical and important indicators of sub-clinical acidosis thus, a presumptive diagnosis thereof was made (2 and 3).

From 13:00 on the same day 8 kg of *Erasgrostis curvula* hay was added between 14 cattle to form a top layer of roughage with feed amount and formulation unchanged (Fig. 3). This was done at each consecutive feeding. Adding roughage to a high concentrate diet increases saliva production and feed intake (3 and 5). Saliva has an effective buffering capacity due to high concentrations of bicarbonate and phosphate (4). In general, as the level of roughage increase, the incidences of acidosis decrease. (5).

After the first feeding with added roughage, feed intake increased and normalized based on the previous week's records. Adding roughage was discontinued on the 2 March.

Although each animal in the feedlot will experience sub-clinical acidosis at least once, it should not be left untreated (5). The economic impact of its effects could be larger than acute acidosis (4).

Adding sufficient, good quality roughage in a sub-clinical acidosis outbreak can successfully treat cattle in minimum time to re-ensure optimal performance and production.

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Addendum:

Figure 1

Figure 2

Figure 3

Management of neurological disorders - diagnosis and management of peripheral nerve damage induced lameness in a feedlot calf

Group number: 6 Task number: 17

Griffioen N K (11096196)

The assessment of neurological disorders is an essential skill of the veterinarian. Accurate diagnosis of disease and aetiology is necessary for appropriate treatment, management plan implementation, and long term prognosis. In the feedlot environment several neurological disorders may occur. This report is centred on the diagnosis and management of peripheral nerve damage induced lameness in a feedlot calf.

A large animal neurological examination is indicated in cattle displaying signs of nervous system disease (central or peripheral) in order to localise lesions to any of the following functional regions: meninges and vestibular system; cerebrum; cerebellum; midbrain; brainstem and cranial nerves; spinal cord; peripheral nerves and neuromuscular junctions (1). A typical neurological exam consists of assessment of mentation and behaviour; posture and gait; postural reactions; cranial nerve function; and spinal nerve reflexes (2).

A basic neurological exam was carried out on a feedlot calf showing clinical signs of bilateral forelimb lameness of a suspected neurological origin. The results obtained indicated normal mentation and behaviour (bright, alert, responsive), normal cranial nerve functions (menace response, eye position and movement, eating habits) and normal spinal reflexes (cutaneous, anal, perineal, patellar, withdrawal). Posture, gait and postural reactions were abnormal with signs of forelimb toe dragging, occasional ataxia, poor proprioception and later lower limb muscle atrophy. A diagnosis of radial nerve damage with flexor deformities (3) due to trauma was made. Treatment thereof was conservative with separation (along with another calf, to prevent excessive stress) (4) from the herd to allow easier feed access. The calf was observed daily for worsening condition.

In conclusion, no further deterioration in mobility, appetite or mentation was noted in the calf and consequently she was not treated with any medication. She was successfully fed until the end of the feedlot period.

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Animal welfare

Group number: 3 and Task number: 18

Vorster I (12022072)

Animal welfare can be measured using the Five Freedoms, as developed by Dr. John Webster in 1979 (1). This includes freedom from hunger or thirst, freedom from discomfort and freedom from disease (2).

The one thing that several articles about feedlots and animal welfare agree on is that it is unrealistic to fulfill all five these freedoms at once (3). In an attempt to improve on this attitude, a checklist was designed, communicated to the group and placed in the feed store. The checklist had to be completed with every feeding and a comment section was available to note any changes. All this information and any problems noted by students were also communicated on a WhatsApp group.

This system ensured that any animals that were identified as diseased or injured were immediately reported, and as in the case of five cattle with footrot after the rain in April and May, these sick individual animals were taken to the crushes on the same day as the problem was identified and were given treatment (2). When moving the cattle to the crushes, care was taken in using humane livestock handling methods like using the flight zone instead of a whip (4). On the 5th of April, three-day-stiff-sickness was identified in the camp. This warranted the use of a cleaning schedule for the water trough in an attempt to reduce the vector load like midges and supply clean water to the animals (5).

In conclusion, according to data obtained throughout the challenge, the biggest welfare concern in a feedlot is disease occurrence and treatment (2). However, monitoring the cattle twice daily at feeding times and ensuring quick responses to diseases helped to keep cattle healthy and in good welfare (6).

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Table 1: Addendum A

Date	Comment	Applicable to which freedom
18 March	No. 5 grey feaces	Freedom from **disease**
19 March	No. 5 still bloated	Freedom from **disease**
20 March	No. 5 still bloated. No. 6 coughing slightly.	Freedom from **disease**
30 March	Water trough cleaned after slick build up	Freedom from hunger or thirst
5 April	**Three day stiff sickness present in camp**	Freedom from **disease**
6 April	No. 6 did not want to move. No. 8 and no. 11 looking much less stiff.	Freedom from **disease**
7 April	No. 1 and no. 11 still look slightly stiff	Freedom from **disease**
9 April	No. 2 and no. 8 refused to get up, even when approached and touched. No. 4 stiff.	Freedom from **disease**
10 April	No. 1 coughed. No. 5 and no. 6 quite stiff	Freedom from **disease**
12 April	No. 2 reluctant to get up. No. 4 very stiff.	Freedom from **disease**
13 April	All steers stood up and came right to the feed bunk without being chased up.	Freedom to express normal behaviour
18 April	**No. 5** diagnosed with **footrot** and treated.	Freedom from **disease**
20 April	No. 4 looked stiff in the morning, but much improved in the afternoon.	Freedom from discomfort
22 April	No. 2 stiff but better in the afternoon. No. 5 no longer has a snotty nose. No. 11 looked less stiff in the afternoon.	Freedom from discomfort
23 April	No. 11 slightly lame in right front leg. No. 2 heavy breathing and refuses to walk.	Freedom from **disease**
3 May	3.5 kg mouldy feed thrown out due to wet molasses bags. No. 1 stiff and lame in right hind leg.	Freedom from hunger or thirst. Freedom from discomfort
4 May	No.1 treated for footrot	Freedom from **disease**
7 May	**Footrot** treatment given to **no. 1, 2, 6 and 10**. Maggots found in foot of no. 2	Freedom from **disease**
8 May	Footrot treatment continued for no. 1, 2, 6, and 10. No. 6 and 10 still very lame.	Freedom from **disease**
10 May	Lameness/ footrot much improved.	Freedom from discomfort
11 May	No. 5 severely bloated	Freedom from **disease**
17 May	No. 5 has snotty nose	Freedom from **disease**

Managing a low grade intermittent rectal prolapse and animal welfare in a feedlot

Group: 7 and Task number: 18

Mthenjane A P (12307132)

Traditionally, measure of health has been recognized as a potentially useful indictor of animal welfare. Productivity is perceived as a questionable welfare indicator in a feedlot setting (1). A welfare concern unique to our group was the occurrence of a low grade intermittent rectal prolapse observed in the heifer identified as 706.

The incidence of rectal prolapse in feedlot cattle is higher compared to that of grazing animals (2). An intermittent rectal prolapse has been linked to the chronic administration of estrogenic hormones (2). The prolapse first observed in heifer 706 occurred shortly after processing where the growth enhancing technology, SYNOVEX, was implanted. The estrogenic compounds make up part of the chemical composition of this implant. The prolapse was frequently observed while heifer 706 was recumbent. The simplest procedure for the correction of a rectal prolapse is reduction by gentle massage and retention by application of a purse-string suture pattern using umbilical tape (2). Despite financial constraints veterinarians as well as veterinarian students possess the moral obligation to use medicines in the treatment of sick animals (3) where group seven chose a palliative method of treatment. The treatment performed consisted of an epidural and lavage of the prolapse with acriflavine along with glycerin to lubricate. The administration of a long-acting non-steroidal anti- inflammatory and broad-spectrum antibiotics to treat a suspected cystitis was carried out on two separate occasions. The prolapse was observed at a lesser frequency while heifer 706 was recumbent after the administration of treatment.

The debate remains that if an animal is gaining weight at an exceptional rate, then their welfare is satisfactory (1). In contrast, increases in productivity often result from specific practices such as the use of growth enhancing technology (1). There is a growing concern in animal welfare implications of growth-promoting technology used in feedlot cattle (4).

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Addendum A

Februar
y

	Date	Feed Given (kg)	Feed Left Over (kg)	Feed Intake (kg)	Wastage (kg) (Rain/ spoilage)	Comments
WEEK 1	Friday 9th (Starter)	90kg	60kg	30kg		
	Saturday 10th	30kg	30kg	60kg		
	Sunday 11th	am: 40kg pm: 20kg	0kg	60kg		
	Monday 12th	am: 40kg pm: 50kg	0kg	90kg		
	Tuesday 13th	am: 40kg pm: 60kg	0kg	100kg		
	Wednesday 14th	am: 40kg pm: 60kg	10kg	90kg		
	Thursday 15th	am: 60kg pm: 60kg	10kg	110kg		1 starter, 2 grower
WEEK 2	Friday 16th (Grower ration)	am: 40kg lunch: 20kg pm: 50kg	1kg grass	119kg		
	Saturday 17th	am: 40kg lunch: 20kg pm: 50kg	1kg grass	110kg		
	Sunday 18th	am: 40kg lunch: 20kg pm: 50kg	1.5kg	108kg	1.5kg	
	Monday 19th	am: 40kg lunch: 20kg pm: 60kg	4kg grass	117.5kg		
	Tuesday 20th	am: 40kg lunch: 20kg pm: 60kg	4kg	116kg		
	Wednesday 21st	am: 40kg lunch: 20kg pm: 60kg	10kg	86kg	28kg	
	Thursday 22nd	am: 40kg lunch: 20kg pm: 60kg	10kg	120kg		2 grower am 1 finisher, 2 grower pm
WEEK 3	Friday 23rd (Finisher ration)	am: 50kg pm: 70kg	10kg	120kg		Used 2 bags grower
	Saturday 24th	am: 50kg pm: 60kg	0kg	120kg		Used 1 bag grower
	Sunday 25th	am: 50kg pm: 70kg	30kg	90kg		
	Monday 26th	am: 50kg pm: 70kg	30kg	120kg		Used 1 bag grower
	Tuesday 27th	am: 30kg pm: 60kg	10kg	110kg		
	Wednesday 28th	am: 50kg pm: 60kg	0kg	120kg		

March

	Date	Feed Given (kg)	Feed Left Over (kg)	Feed Intake (kg)	Wastage (kg) (Due to rain, spoilage etc.)	Comments
	Thursday 1st	am: 60kg pm: 60kg	4kg grass	107.5kg	8.5kg due to remixing	
WEEK 4	Friday 2nd	am: 60 kg pm: 60 kg	0kg	124kg		
	Saturday 3rd	am: 60kg pm: 60kg	0kg	120kg		
	Sunday 4th	am: 60kg pm: 60kg	0kg	120kg		
	Monday 5th	am: 60kg pm: 60kg	20kg	100kg		
	Tuesday 6th	am: 60kg pm: 60kg	20kg	120kg		
	Wednesday 7th	am: 50kg pm: 40kg	40kg	70kg		
	Thursday 8th	am: 60kg pm: 70kg	40kg	90kg		
WEEK 5	Friday 9th	am: 50kg pm: 70kg	20kg	100kg		
	Saturday 10th	am: 60kg pm: 60kg	15kg	105kg		
	Sunday 11th	am: 60kg pm: 70kg	20kg	110kg		
	Monday 12th	am: 60kg pm: 40kg	20kg	80kg		
	Tuesday 13th	am: 40kg pm: 60kg	10kg	90kg		
	Wednesday 14th	am: 60kg pm: 60kg	5kg	115kg		
	Thursday 15th	am: 60kg pm: 60kg	0kg	120kg		
WEEK 6	Friday 16th	am: 60kg pm: 60kg	1.5kg	118.5kg		
	Saturday 17th	am: 60kg lunch: 20kg pm: 60kg	12kg	108kg	20kg rain replaced at 1pm	
	Sunday 18th	am: 60kg lunch: ½ bag hay pm: 60kg	3kg	117kg		
	Monday 19th	am: 70kg pm: 60kg	10kg	120kg		
	Tuesday 20th	am: 60kg pm: 60kg	15kg	105kg		
	Wednesday 21st	am: 60kg pm: 40kg	0kg	100kg		
	Thursday 22nd	am: 40kg lunch: 20kg pm: 40kg	0kg	100kg	5kg	
	Friday 23rd	am: 40kg	10kg	100kg		

WEEK 7		lunch: 20kg pm: 50kg				
	Saturday 24th	am: 60kg pm: 70kg	20kg	110kg	2kg	
	Sunday 25th	am: 60kg pm: 70kg	26kg	104kg		
	Monday 26th	am: 60kg pm: 66kg	12.5kg	113.5kg		
	Tuesday 27th	am: 60kg pm: 70kg	30kg	100kg		
	Wednesday 28th	am: 60kg pm: 70kg	40.5kg	89.5kg		
	Thursday 29th	am: 20kg pm: 70kg	15kg	75kg		
	Friday 30th	am: 40kg pm: 70kg	14.5kg	95.5kg		
	Saturday 31st	am: 60kg pm: 60kg	20kg	100kg		

April

	Date	Feed Given (kg)	Feed Left Over (kg)	Feed Intake (kg)	Wastage (kg) (Due to rain, spoilage etc.)	Comments
WEEK 8	Sunday 1st	am: 60kg pm: 50kg	7kg	103kg		
	Monday 2nd	am: 70kg pm: 50kg	14.5kg	105.5kg		
	Tuesday 3rd	am: 70kg pm: 60kg	32.5kg	97.5kg		
	Wednesday 4th	am: 60kg pm: 40kg	12.5kg	87.5kg		
	Thursday 5th	am: 60kg pm: 70kg	17kg	113kg		
WEEK 9	Friday 6th	am: 60kg pm: 60kg	34kg	86kg		
	Saturday 7th	am: 40kg pm: 50kg	15kg	75kg		
	Sunday 8th	am: 60kg pm: 60kg	28kg	92kg		
	Monday 9th	am: 40kg pm: 60kg	0kg (no data)	98kg	2kg	
	Tuesday 10th	am: 60kg pm: 60kg	15kg	105kg		
	Wednesday 11th ZILMAX	am: 60kg pm: 68kg	20kg	108kg		
	Thursday 12th	am: 60kg pm: 52kg	5kg	107kg		
WEEK 10	Friday 13th	am: 60kg pm: 60kg	15.5kg	104.5kg		
	Saturday 14th	am: 50kg pm: 68kg	0kg	118kg		

	Sunday 15th	am: 60kg pm: 60kg	(the 2.5kg that was wet)	117.5kg	2.5kg	
	Monday 16th	am: 68.5kg pm: 58kg	12.5kg	114kg		
	Tuesday 17th	am: 75kg pm: 60kg	9.5kg	125.5kg		
	Wednesday 18th	am: 40kg lunch: 30kg pm: 65kg	10.5kg	124.5kg		
	Thursday 19th	am: 60kg pm: 60kg	22.5kg	97.5kg		
WEEK 11	Friday 20th	am: 47.5kg pm: 60kg	5.5kg	102kg		
	Saturday 21st	am: 64.5kg pm: 60kg	13.5kg	111kg		
	Sunday 22nd	am: 56.5kg pm: 60kg	1.5kg	115kg		
	Monday 23rd	am: 78.5kg pm: 50kg	16kg	112.5kg		
	Tuesday 24th	am: 64kg pm: 50kg	4kg	110kg		
	Wednesday 25th	am: 76.4kg pm: 50kg	5.5kg	120.9kg		
	Thursday 26th	am: 80kg pm: 50.5kg	0kg	130.5kg		
WEEK 12	Friday 27th	am: 80kg pm: 50kg	0kg	130kg		
	Saturday 28th	am: 80kg pm: 50kg	13kg	117kg		
	Sunday 29th	am: 67kg pm: 48kg	16.5kg	98.5kg		
	Monday 30th	am: 63.5kg pm: 46kg	8.5kg	101kg		

May

	Date	Feed Given (kg)	Feed Left Over (kg)	Feed Intake (kg)	Wastage (kg) (Due to rain, spoilage etc.)	Comments
	Tuesday 1st	am: 72kg pm: 50kg	14.5kg	107.5kg		
	Wednesday 2nd	am: 80kg pm: 46.5kg	12.5kg	114kg		
	Thursday 3rd (Mixing and weighing)	am: 67.5kg pm: 50kg	14kg	103.5kg		
WEEK 13	Friday 4th	am: 74kg pm: 46kg	9.5kg	110.5kg		
	Saturday 5th	am: 60kg pm: 64kg	23kg	101kg		
	Sunday 6th	am: 79.5kg pm: 50kg	0kg	129.5kg		
	Monday 7th	am: 80kg	5kg	125kg		

		pm: 50kg				
	Tuesday 8th	am: 75kg pm: 50kg	11.5kg	113.5kg		
	Wednesday 9th	am: 69.5kg pm: 48kg	5kg	112.5kg		
	Thursday 10th	am: 78kg pm: 52kg	10.5kg	119.5kg		
WEEK 14	Friday 11th	am: 70.5kg pm: 50kg	16.5kg	104kg		
	Saturday 12th	am: 80kg pm: 50kg	3.5kg	126.5kg		
	Sunday 13th	am: 76.5kg pm: 42.5kg	7kg	112kg		
	Monday 14th	am: 73kg pm: 50kg	0kg	123kg		
	Tuesday 15th	am: 80kg pm: 50kg	5kg	130kg		
	Wednesday 16th	am: 75kg pm: 50.5kg	0kg	125.5kg		
	Thursday 17th	am: 80kg pm: 50kg	17kg	113kg		
WEEK 15	Friday 18th	am: 63kg pm: 48kg	13.5kg	97.5kg		
	Saturday 19th	am: 66.5kg pm: 50kg	0kg	116.5		
	Sunday 20th	am: 80kg pm: 50kg	25kg	105kg		
	Monday 21st ZILMAX end	am: 55.5kg pm: 50kg	12kg	93.5kg		
	Tuesday 22nd	am: 80kg pm: 50kg	10kg	120kg		
	Wednesday 23rd	am: 69.5kg pm: 50kg	8kg	111.5kg		
	Thursday 24th	am: 98.5kg				
	Friday 25th (Slaughter)					

Marketing of group activities and maintaining group's visibility

Group number: 6 and Task number: 19

Hutchesson M L (14028035)

The marketing portfolio in a business includes advertising products or services, as well as promoting the business' brand. Traditionally, this has always been done through advertising in newspapers and word- of-mouth. However, nowadays social media has become the method of statement for the 21st century (1). Facebook and Instagram were used as the principle media platforms during this assignment.

The creation of a positive social media presence is of vital importance and the principle platform used should be Facebook due to it being the largest growing social network site (2). A Facebook page as well as an Instagram account were created under the name 'Die Vetter the Better.' The posts uploaded to the platforms consisted of a combination of photographs of the calves, as well as photographs taken of the group members during the feed-mixing practicals. Vivid posts which stimulate more than one sense have a greater click-through rate (3). One such post included a video of different steak recipes which was shared from another page 'Taste'. This provided both visual and auditory stimuli to the users, as well as made important links to other Facebook pages, thus increasing our page's social media interaction (4).

The Facebook page currently has 90 followers and the Instagram account had 173, which exceeds our competitors' likes which had 68 and 87. The top performing post reached 440 viewers. Many questions were posted on our page, which were answered timeously. Facebook has a promotion function which allows target-based marketing at a competitive price. However, this was not made use of due to budget restrictions.

In conclusion, social media marketing is a widely growing field and can be used for many different business models. This form of marketing allows for maximal interaction with the public and the current principle platform should be Facebook.

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Record keeping

Group number: 5 and Task number: 20

Grundling A (10076540)

The impact multi-faceted record keeping has on calf health and efficiency is investigated.

Records include general coordination (capturing of feeding schedules and average daily gain assessments), financial planning, feed store management and disease monitoring. With good management, early disease detection improves herd health (1). Weekly records were kept to minimize wastage and the risk of moldy feed (2). Surveillance occurred during feeding times, any suspected disease was noted, assessed and treatment given. Feed intake, excess, wastage and fecal scoring were conducted concurrently with feeding times and pen upkeep. Recording was imperative to avoid acidotic states as the feed formation evolved from starter to finisher ration (3).

Carcass gain efficiency was evaluated after abattoir processing (Table 1). Hard copy group coordination records were most efficient (Table 2). Good management ensured below threshold pathogen levels, identifying problems before they became hazardous (2). Computerized financial records ensured coherent information management (Table 3). To maintain effectiveness associated with electronic records, proper accounting training is necessary (4). On-line auctioneering is an alternative, decreasing financial burden and increasing animal welfare by eliminating stressors (1). Feed store records were adequate, albeit electronic copies could have been more frequently updated. Previous studies positively correlate electronic record keeping to better time management (4). Conversely, hard copies were logistically easier. Real-time data capture avoided lag-times associated with updating electronic versions. Disease monitoring increased in importance as the diet ration increased in energy concentration (3). Similar findings have been made by Berry et al. (2004). Whether pathogen levels were similarly increasing with time couldn't be evaluated. In future, focus will be on record amalgamation, finding patterns of poor management between facets of feedlot production.

In conclusion, the study concurs with the Red Meat Producers' Organization that in order to develop an optimal livestock operation, a structured approach of recording is imperative (5).

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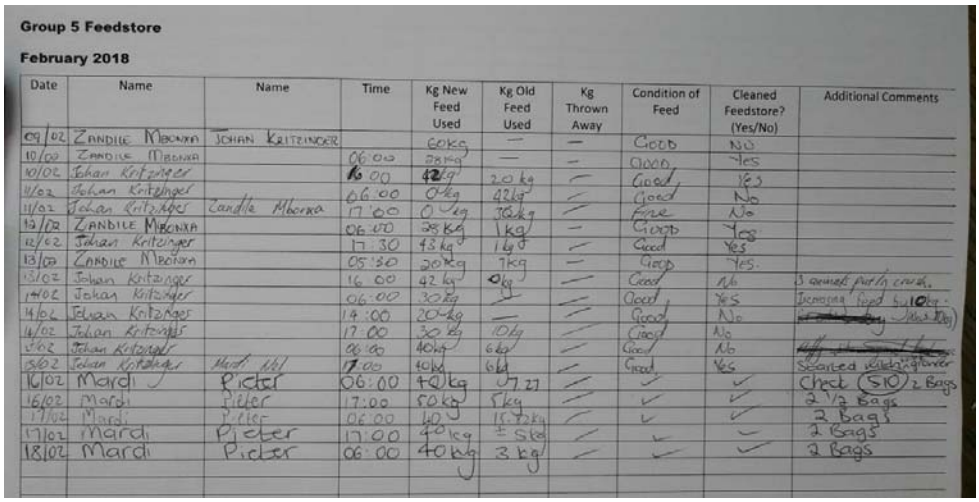
Appendix

Table 1 Abattoir records

Calf ID	Gender	Carcass Grade	Warm Mass	Cold Mass	Live mass	Slaughter percentage	Rumen score
501	♀	A2	274.6	266.4	440	60.55	Normal
502	♀	A2	247.6	240.2	398	60.35	Mild scarred
503	♀	A2	283	274.5	450	61	Mild scarred
504	♀	A2	276	267.7	507	52.8	Mild scarred
505	♀	A2	274.4	266.2	436	61.06	Normal
506	♀	A2	283	274.5	436	62.96	Normal
507	♂	A3	286.6	278	438	63.47	Normal
508	♀	A2	256	248.3	393	63.18	Moderate
509	♀	A2	309.8	300.5	486	61.83	Mild scarred
510	♂	A2	304.8	295.7	467	63.32	Mild scarred
Total			2795.8	2712	4451		
Average			**279.58**	**271.2**	**445.1**	**61.052**	

Table 2 Hard copy Feed store management



Group 5 Feedstore

February 2018

Date	Name	Name	Time	Kg New Feed Used	Kg Old Feed Used	Kg Thrown Away	Condition of Feed	Cleaned Feedstore? (Yes/No)	Additional Comments
09/02	Zandile Mbonxa	Johan Kritzinger		60kg	—	—	Good	No	
10/02	Zandile Mbonxa		06:00	28kg	—	—	Good	Yes	
10/02	Johan Kritzinger		16:00	42kg	20 kg	—	Good	Yes	
11/02	Johan Kritzinger		06:00	0kg	42kg	—	Good	No	
11/02	Johan Kritzinger	Candile Mbonxa	17:00	0kg	30kg	—	Fine	No	
12/02	Zandile Mbonxa		06:00	28kg	1kg	—	Good	Yes	
12/02	Johan Kritzinger		17:30	43kg	1kg	—	Good	Yes	
13/02	Zandile Mbonxa		05:30	20kg	7kg	—	Good	Yes.	
13/02	Johan Kritzinger		16:00	42 kg	0kg	—	Good	No	3 animals partly cured.
14/02	Johan Kritzinger		06:00	30kg	—	—	Good	Yes	Incoming feed 5x10kg -
14/02	Johan Kritzinger		14:00	20-kg	—	—	Good	No	[redacted]
14/02	Johan Kritzinger		17:00	30 kg	10kg	—	Good	No	
15/02	Johan Kritzinger		06:00	40kg	6kg	—	Good	No	[redacted]
15/02	Johan Kritzinger	Mardi 16/	17:00	40kg	6kg	—	Good	Yes	Scarred with slight fever
16/02	Mardi	Pieter	06:00	40kg	7kg	—	✓	✓	Check (510) 2 Bags
16/02	Mardi	Pieter	17:00	50kg	5kg	—	✓	✓	2 1/2 Bags
17/02	Mardi	Pieter	06:00	40	15.7kg	—	✓	✓	2 Bags
17/02	Mardi	Pieter	17:00	40kg	± 5kg	—	✓	—	2 Bags
18/02	Mardi	Pieter	06:00	40kg	3 kg	—	✓	✓	2 Bags

Table 3 Excel Financial records summary

Total Feed Costs	R 21 268.02
Total Processing Costs	R 1 906.48
Total Pharmacy Costs	R 334.45
Total Purchase Price of Calves	R 117 000.00
TOTAL EXPENSES	R 140 508.95
TOTAL INCOME (excl. VAT)	R 128 820.00
Loss	R 11 688.95

Record keeping in a feedlot system

Group number: 2 and Task number: 20

Simon M (13013107)

Good record keeping systems are imperative for successful business management (1). Particularly in feedlots, diligent record keeping is essential to effectively monitor disease and treatment responses. Production performances can also be tracked this way (2). It can thus be useful to feedlot managers, veterinarians and nutritionists (2) in the pursuit of a well-managed feedlot and should be used as a tool to improve efficiency in order to grow profit margins in a competitive market (3).

In order to manage disease and behaviour, a table was drawn up (Table 1) suited for monitoring individual animals on a twice daily basis. While table 1 covered many common signs of disease, another table (Table 2) was drawn up to ensure enclosure maintenance. These records were collected at the end of each month. During the challenge a paper-based system was used.

Managing individual animals is important in intensive systems, as it yields accurate measures of performance and welfare (3). Consequently, diligent record keeping was practiced throughout the challenge using a paper-based system, as there were few animals and it allowed all members to experience the responsibilities involved with record keeping. In commercial settings computer-based systems are more often employed. However, when commercial feedlots do make use of paper-based systems, these are generally found to be satisfactory but labour intensive (4). Ultimately, this system resulted in quick responses to medical emergencies and effective monitoring of individuals in the herd (2, 5). Conditions monitored included lameness, secondary to hip luxation, and a permanent cartilage injury case. Additionally, since the second week of the challenge, another animal has been monitored for chronic respiratory disease. Timeous observation and treatment of these cases prevented clinical progression.

In conclusion, through the simple tables provided below, meticulous record keeping was made possible and is essential for disease monitoring and production output.

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Addendum A

Table 1: Showing the different behaviours or signs observed when monitoring cattle

Cattle	Feed	Water	Recumbent	Respiratory signs	Depressed	Coat signs	Body condition	Lameness	Git signs	Comments
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Table 2: Showing enclosure management monitoring aspects

MAY	BALL VALVE		WATER CLEANED	TROUGH CLEANED	BIRD CONTROLL	
1			PM	AM		
2			PM	AM		
3			PM	AM		
4			PM	AM		
5						
6						
7			PM	AM		
8			PM	AM		
9			PM	AM		
10			PM	AM		
11			PM	AM		
12						
13						
14			PM	AM		
15			PM	AM		
16			PM	AM		
17			PM	AM		
18			PM	AM		
19						
20						
21			PM	AM		
22			PM	AM		
23			PM	AM		
24			PM	AM		
25			PM	AM		
26						
27						
28			PM	AM		
29			PM	AM		
30			PM	AM		
31			PM	AM		

Note: All days highlighted in red are days allocated to clean the hospital pen and all days highlighted in green are days to clean the main pen.

Using the abattoir to evaluate calf health and efficiency

Group number: 1 and Task number: 21

Joubert A (14054567)

Abattoir inspection and classification of carcasses can be a valuable tool when assessing the overall health status and production of calves in a feedlot setting (1). As part of the OP Feedlot Challenge, 14 calves managed by group one were slaughtered after a feeding period of 105 days and their carcasses subsequently inspected by group members.

Weights of the calves were recorded by automated equipment at different points on the slaughter line. This was later used in the calculation of dressing percentage and average daily gain (ADG). The carcasses were graded based on age and fat content (1). After evisceration, organs were inspected for specific lesions that frequently occur in feedlot calves (2). The data obtained was then presented in a table (see addendum A).

The average live mass at slaughter was 423 kg. The carcasses proceeded to dress at an average of 62,19%. All of the carcasses were graded as A-class and majority were lean (1). No bruising or liver pathology was present. Lung lesions included two cases of acute inflammation, two cases of chronic adhesions and one case of severe acute pleuritis (3). During rumen evaluation, four rumens did not arrive at the offal handling room. Of the 10 rumens received, 2 presented with single stars, indicating a history of acidosis (4). A further two were affected with acute rumenitis, one of which also presented with 4 rumen stars. The majority of calves that presented with pathological lesions at slaughter had a decreased ADG when compared to the rest of the group.

The abattoir inspection revealed lesions in individual calves that had no prior history of illness, suggesting that disease monitoring by the group should be improved. Undiagnosed and untreated conditions adversely affected production, leading to decreased carcass gains.

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Addendum A

Calf	Carcass grade	Live weight (kg)	Initial weight (kg)	Average Daily Gain	Cold mass (kg)	Dressing %	Rumen lesions	Lung lesions	Liver lesions	Disease history
1	A3	492	232	2,476190476	290,6	59,07		Fibrous adhesions	None	3DSS
2	A2	384	239	1,380952381	245,4	63,91	1 Large star	Fibrous Adhesions	None	Nasal excretion
3	A2	462	260	1,923809524	282,3	61,1	4 stars + Acute rumenitis	Spider web adhesions	None	
4	A2	392	233	1,514285714	249,1	63,55	None	TOTAL CONDEMNATION	None	
5	A2	471	260	2,00952381	290,2	61,61	None	None	None	
6	A2	412	238	1,657142857	250,3	60,75	None	None	None	3DSS
7	A2	460	230	2,19047619	286,7	62,33	None	None	None	
8	A2	443	240	1,933333333	276,5	62,42		None	None	
9	A2	365	271	0,895238095	220,8	60,49	None	None	None	
10	A2	406	260	1,39047619	261,7	64,46	None	None	None	
11	A2	448	260	1,79047619	269,9	60,25	1 star	None	None	3DSS, footrot
12	A3	390	233	1,495238095	246	63,08		Spider web adhesions	None	
13	A2	437	230	1,971428571	281,7	64,46	Acute rumenitis	None	None	
14	A2	354	260	0,895238095	223,5	63,14		None	None	
	TOTAL	5916	3446		3674,7	870,62				
	AVERAGE	**422,57**	**246,14**	**1,68**	**262,48**	**62,19**				

Certification of wholesome beef

Group: 2 and Task number: 22

Pillai C (12015832)

For beef to be certified as wholesome, it must be subjected to classification and/or grading systems to describe the quality and yield of a carcass, ensuring consistent nutritious meat quality and consumer satisfaction (1).

Ten cattle were transported to the abattoir where they were rested overnight. Upon arrival of the students, the cattle were moved through the crush and weighed. The live masses were subsequently recorded (Table 1). The cattle were then slaughtered, and the processes of dressing and evisceration were observed. The organs excluding rumens were inspected for pathology in the dressing area; rumens were inspected afterwards in the green offal area.

South Africa utilises a classification rather than grading system (2). Eight carcasses were classified as A2 and two as A3 (Table 1). This is consistent with the current ideals of carcass fat content in South Africa (3). Lung pathology was observed; however, none in the lungs of carcass number 4 (Table 2). As pathology here was expected, it can be concluded that antemortem treatment for pneumonia was successful. Rumen pathology was noted (Table 2). In some cases, this can be attributed to rumenitis that was overcome (4). One liver exhibited *Fasciola hepatica* and was subsequently condemned (Table 2). The presence of *Fasciola hepatica* in only one of the cattle may have erupted during backgrounding, as the cattle came from different backgrounds. The feedlot conditions at Onderstepoort render acquisition of *Fasciola hepatica* unlikely, though not impossible (5). No damage to meat of any carcasses was reported.

According to the Meat Safety Act (40 of 2000) and its associated Red Meat Regulation Gazette (1072 of 2004), wholesome beef must be safe for human and animal consumption (6). Similar to this, whilst considering the classification system utilised, all the cattle yielded meat that was satisfactory and deemed wholesome.

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Addenda

Table 1

Tag number	Line number	Live mass (kg)	Grade code
1	486	492	A3
2	482	485	A2
3	479	395	A2
4	478	379	A2
5	484	460	A2
6	477	271*	A2
7	480	458	A2
8	485	462	A2
9	483	437	A3
10	481	435	A2

*error, received as is from abattoir

Table 2

Tag number	Line number	Lung pathology	Rumen pathology	Liver pathology
1	486	Atelectasis, pleuritis	-	-
2	482	Pneumonia, strong adhesions	-	-
3	479	Spider-web adhesion (insignificant)	10 healed rumen stars. Slight red colour	-
4	478	-		Multifocal pale areas
5	484	-	Large rumen star	-
6	477	One adhesion - left apical lobe	Acute rumenitis, many stars	-
7	480	-	Two small rumen stars	-
8	485	-	-	-
9	483	Fibrin adhesions	-	*Fasciola hepatica*
10	481	-	One big, healed rumen star	-

Certification of wholesome beef

Group number: 1 and Task number: 22

Tayob Z (13205766)

The veterinarian's job includes advisory and hands-on roles throughout the production chain, including safety interventions and meat inspections to ensure a safe and wholesome supply of beef to the consumer (1). To ensure this goal, a holistic approach encompassing treatment protocols, animal husbandry and kraal management was implemented.

The processing of cattle prior to entering the feedlot included several high risk tasks which could render carcasses, or parts thereof, unsafe for human consumption. Rough handling of the cattle was avoided as bruising of the carcass doesn't allow a natural drop in pH, thus resulting in condemned and trimmed portions (2). No bruising was observed on the carcasses during meat inspection.

Inappropriate administration or timing of vaccinations and antibiotics can result in meat residues (2). For this reason all necessary vaccinations were carried out during the initial processing. Zilmax was removed 3 days prior to slaughter to avoid such residues (3). Incorrect administration can also lead to injection site necrosis and such lesions must be trimmed out (2) (4). Cattle number 102 exhibited a reaction to Terramycin with apparent lameness, reflecting poor technique. The lesion was condemned and trimmed out at the abattoir.

Environmental sanitation plays a key role in the health and welfare of animals (1). When approached correctly, it reduces the need for veterinary intervention (1). Water troughs and feed bunks were cleaned weekly and daily respectively. In addition, daily inspection of drainage and faeces was carried out. Despite aforementioned interventions, cattle number 111 developed foot rot.

A final ante-mortem inspection was performed at the lairages to ensure no injuries occurred during transportation. All carcasses were passed and graded A2 to A3 at the abattoir, indicating the successful implementation of preventative measures. However, administration technique and kraal management would need to be improved to avoid the observed issues.

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