



Key Nutritional Principles for Profitable Dairy Farming

Successfully Rearing Heifers: From Weaning to Calving

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Successfully Rearing Heifers: From Weaning to Calving

- Why?
- How are we doing now?
- Issues and Opportunities
 - Conception to birth
 - Birth to weaning
 - Weaning to mating
 - Mating to 22 months
 - 22 Months to calving



Today's Calf, Tomorrow's Cow

- The best genetics on the farm
- Must be sufficiently well grown to reach puberty and get in calf by 15 months
- For optimal production heifers should be well grown, but not fat, at calving (CS = 5.5)
- Rearing costs to first lactation = ± \$1 433¹

¹ Voogt and McNaughton, 2013

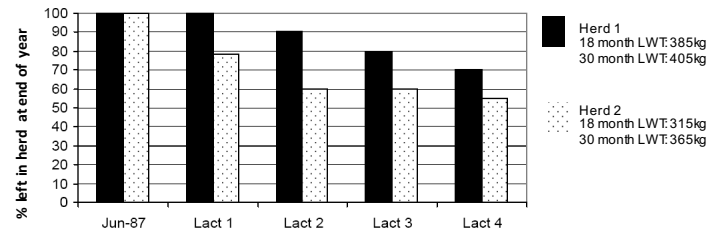
Age at First Calving

- Ideal age at first calving is 22 - 24 months.
- Increased age at first calving
 - increases rearing costs
 - is associated with lower lifetime economic performance



Bodyweight at First Calving

- Increased body weight at first calving
– increases survivability



From Taylor, 2008 after Bryant and McRobbie, 1991



Bodyweight at First Calving

- Increased bodyweight at first calving
 - increases first lactation milk production.
 - increases lifetime milk production.
- NZ data showed a 0.12kg MS increase/ additional kg live weight.

Weight at First Test (kg)	Increase in First lactation Milk Yield
<408	0
408–430	196
431–453	317
454–476	424
477–499	542
500–522	710
523–545	806
546–568	825
569–591	884
592–614	902
615–637	907
638–660	882

From Speeded: after Keown, 1986



Growth Rates

- Required growth rates are a function of calf weight and mature body mass.

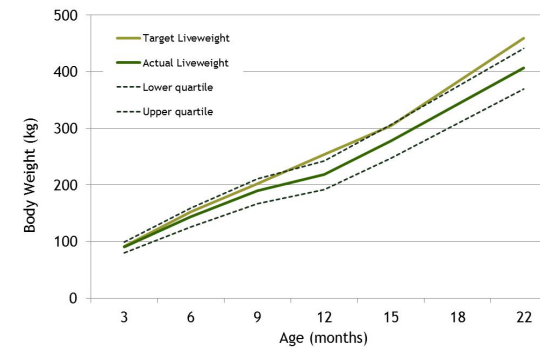
Target live weights for age for New Zealand Heifers

Mature cow live weight	400	450	500	550	600
3 months (fully weaned)	70	80	90	100	110
6 months (30% mature mass)	120	135	150	165	180
9 months	160	180	200	220	240
12 months	200	225	250	275	300
15 months (60% mature mass)	240	270	300	330	360
18 months	290	330	365	400	440
22 months (90% mature mass)	360	405	450	495	540

From InCalf, DairyNZ.



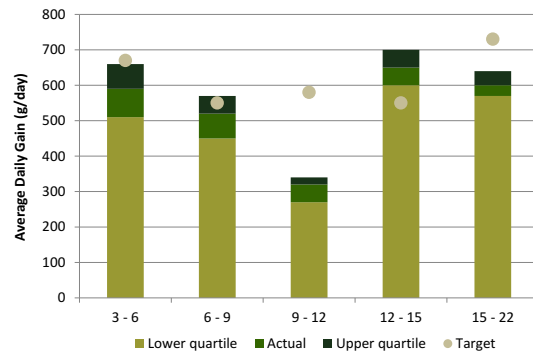
New Zealand Heifer Performance



From McNaughton and Loddell, 2012



New Zealand Heifer Performance



From McNaughton and Lopdell, 2012



Conception to Birth

- Condition score
- Pre-calving trace mineral nutrition
- Vaccination improves levels of antibodies in colostrum, if cows are well fed
- Reduce incidence of calving difficulty which results in weak calves
 - Improve nutrition of the transition cow
 - Consider other factors affecting dystocia
- Calving environment

Picture courtesy of Ottagio Dairy Time

Birth to Weaning

- Colostrum: Quality, Quantity, Quickly, Quietly
- Whole milk / milk replacer
- Ad lib access to clean water
- Quality grain based calf feed with a coccidiostat from 4 days of age
- Attention to detail

Weaning to Mating

- The onset of puberty is more related to weight than to age.
 - Animals which have difficulty conceiving are often poorly developed at 6 – 9 months of age
Wathes et al. (2008)
 - Heifers calving at 23 months are heavier at 6 months than heifers calving at 23 – 30 months, with no difference at 19 or 15 months
Cooke et al. (2013)
 - Heifers that fail to calve achieve a significantly lower percentage of live weight at 15 months
McNaughton and Lopdell (2013)



Weaning to Mating

Effect of live weight and growth rate at mating on conception rates in Friesian Heifers in Western Australia (Hough, 1993)

Mating Live Weight (kg)	Conception Rate to First Service (%)
< 340	55
340 - 355	59
356 - 370	70
> 370	72
Losing weight at mating	58
Maintaining or gaining weight	72

From Taylor, 2008: Calving to Cup: Rearing Heifers from Weaning to Calving

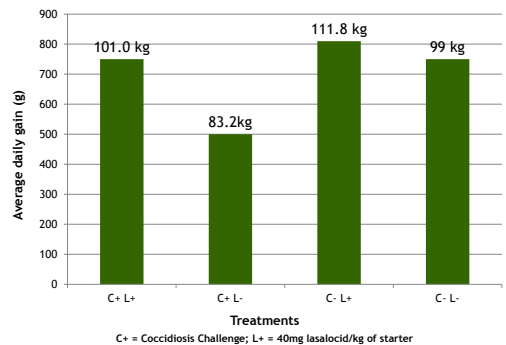


Weaning to Mating

- Develop the rumen: Feed and water
- Wean based on feed intake and weight gain
 - Calves should be eating 1 kg of calf feed per day
 - Calves should have gained 35kg from birth
- Reduce stress: Make changes gradually
 - Transport
 - Change of diet
- Prevent disease: BVD, parasites, coccidiosis



Effect of Coccidiosis and Lasalocid on Weight Gain



From Seib et al., 1992, JAVMA, 200: 947



Weaning to Mating

- Develop the rumen: Feed and water
- Reduce stress: Make changes gradually
- Prevent disease: BVD, parasites, coccidiosis
- Sufficient feed: Quantity and quality



Effect of Feed Quality on Feed Intake

	Low Quality	Medium Quality	High Quality
Forage NDF (%)	55.1	44.7	39.7
Hay intake (kg/day)	2.40 ^a	2.67 ^b	2.48 ^b
Meal intake (kg/day)	1.70	1.70	1.70
Average daily gain (kg/day)	0.87 ^a	0.95 ^b	0.97 ^b

From Linn and Raeth-Kight, 2007



Summer Feed Quality

Live weight (kg)	6 months	120	135	150	165	180
	9 months	160	180	200	220	240
Required ADG (g/day)		440	500	560	610	670
Pasture requirement (kg/day)	9 MJ/kg DM	4.5	5.0	5.5	5.9	6.4
	10 MJ/kg DM	3.7	4.1	4.5	4.9	5.2
	11 MJ/kg DM	3.1	3.5	3.8	4.1	4.4

Dairy NZ: 150kg animal at 0.6kg/day = 3.2kg 11 MJ pasture
200kg animal at 0.6kg/day = 4.1kg 11 MJ pasture



Consider Supplementation

- A good quality supplement
 - Provides a source of energy for growth
 - Can be used to supplement macro and trace minerals
 - Can be used to supplement protein in summer
 - Can be used to supplement zinc for facial eczema control
 - Can include an ionophore for coccidiosis



Winter: 9 – 12 months

Live weight (kg)	9 months	160	180	200	220	240
	12 months	200	225	250	275	300
Required ADG (g/day)		440	500	560	610	670
Pasture requirement (kg/day)	10 MJ/kg DM	4.7	5.3	5.8	6.2	6.7
	11 MJ/kg DM	4.0	4.4	4.9	5.3	5.7
	12 MJ/kg DM	3.4	3.8	4.1	4.5	4.8



Effect of feeding spoiled silage

Whitlock et al., 2000

	Percent spoiled silage in the ration of beef animals			
	0	25	50	75
Dry Matter Intake (kg/day)	7.95 ^a	7.36 ^b	6.95 ^{bc}	6.68 ^c
Digestibility (%)				
Dry Matter	74.7 ^a	68.9 ^b	67.2 ^b	66.0 ^b
Crude Protein	74.6 ^a	70.5 ^b	68.0 ^{bc}	62.8 ^c
Starch	94.6	95.0	93.3	95.3
NDF	63.2 ^x	56.0 ^{xy}	52.5 ^y	52.8 ^y
ADF	56.1 ^a	43.2 ^b	41.3 ^b	40.5 ^b

abc Means in a row with different superscripts differ (P<0.05)

xy Means in a row with different superscripts differ (P<0.10)



Mating to 22 Months

Effect of feeding level pre and post mating on conception rates (Vetcare Grazing, 2001)

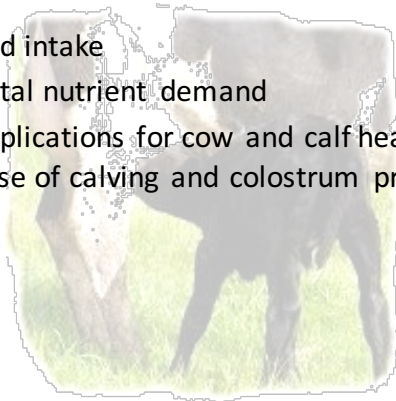
Feeding Regime	Conception rate to First Service (%)
High Pre - Low Post	38
High Pre - High Post	65
Low Pre - High Post	71
Low Pre - Low Post	70

From Taylor, 2008: Calf to Cup: Rearing Heifers from Weaning to Calfing



22 Months to Calving

- ↓ feed intake
- ↑ foetal nutrient demand
- → implications for cow and calf health, ease of calving and colostrum production

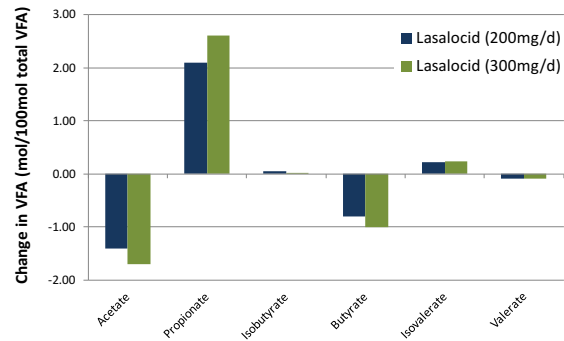


22 Months to Calving

- Introduce new feeds as early as possible
 - High energy density
 - Development of rumen papillae
 - Adaptation of rumen microbes
 - Efficiency of feed utilisation post calving
- Protein ?
- Trace minerals ✓
- Ionophores ✓
- Manage to ensure access to feed



Effect of Lasalocid on VFA Production



From Spears and Harvey, 1984. Journal of Animal Science, 58:460



22 Months to Calving

- Introduce new feeds as early as possible
 - High energy density
 - Development of rumen papillae
 - Adaptation of rumen microbes
 - Efficiency of feed utilisation post calving
- Protein ?
- Trace minerals ✓
- Ionophores ✓
- Reduce intake of high K feeds



Target Body Weights

Mature cow live weight	400	450	500	550	600
3 months (fully weaned)	70	80	90	100	110
6 months (30% mature mass)	120	135	150	165	180
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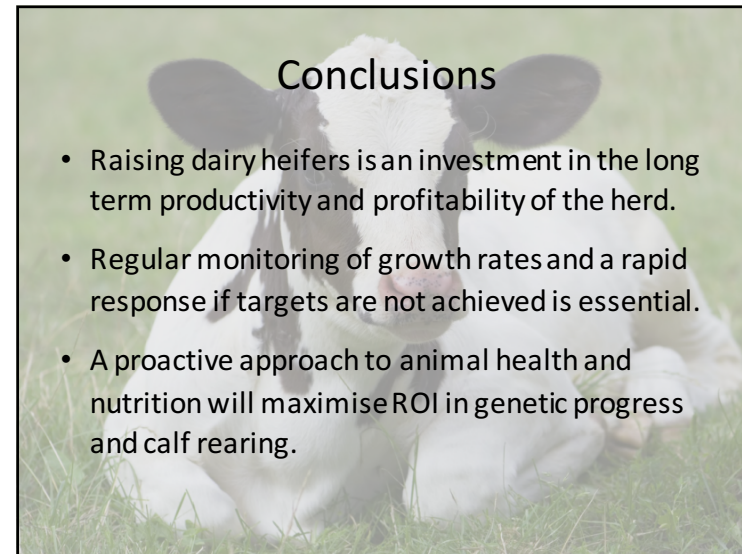
Aim to calve at CS = 5.5

From DairyNZ



Conclusions

- Raising dairy heifers is an investment in the long term productivity and profitability of the herd.
- Regular monitoring of growth rates and a rapid response if targets are not achieved is essential.
- A proactive approach to animal health and nutrition will maximise ROI in genetic progress and calf rearing.



Acknowledgments

- Pauline Inwood

