

Nutritional Approaches to Decrease Stress in Calves

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Heifers are the foundation of the herd

Heifers are costly

Nearly 25% percent of a dairy's production costs are in raising heifer replacements

Heifers are a black box

Farmers have daily touch points with lactating cows, while heifers aren't usually front of mind

Heifers are the future

Healthy, genetically advanced heifers that calve at the right maturity are the foundation for a productive herd

Grow enough heifers and grow them well

Reducing heifer rearing costs starts with getting morbidity and mortality under control

If primiparous cows can't perform in the herd, early AFC won't pay off

- Growing enough heifers starts with breeding the right number of heifers
- The next step is to maximize the number of heifers born at your farm that enter the herd as **HEALTHY 2-year-olds**
- Target heifers reaching 80-85% of mature body weight at first calving

To protect your ROI, pair sound management with nutrition strategies that reduce, not compound, common calf stressors.

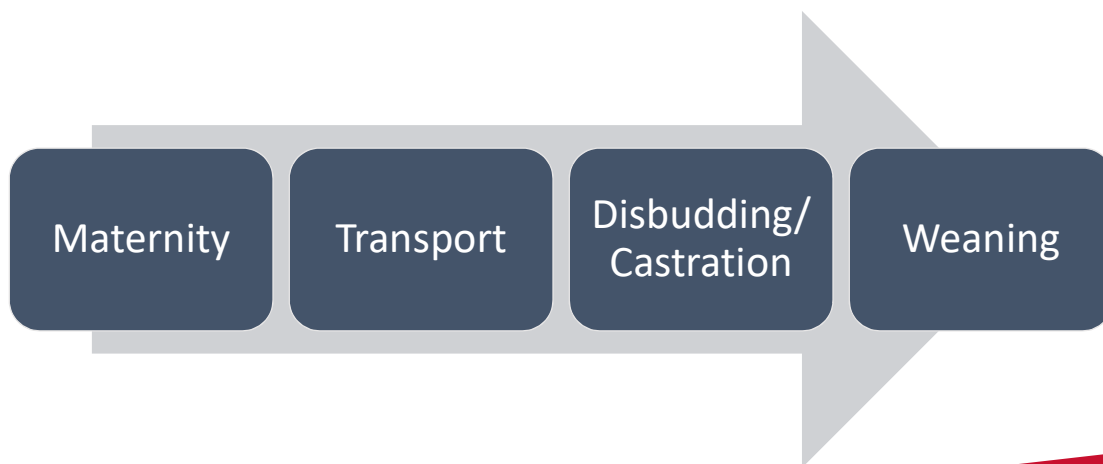
Calves commonly experience several stressors that have implications for performance and ROI

Nutritional strategies can mitigate these stressors

Pair good nutrition with best management practices to mitigate stress in calves

Calves commonly experience several stressors that have implications for performance & ROI

Calf stressors: A partial overview

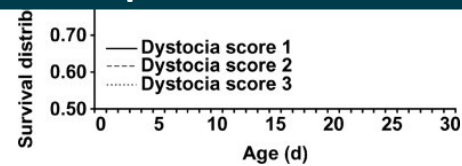
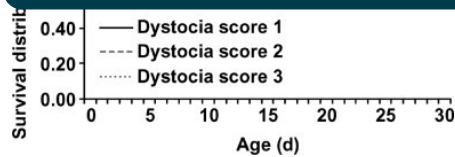


Maternity & dystocia

Including stillbirths

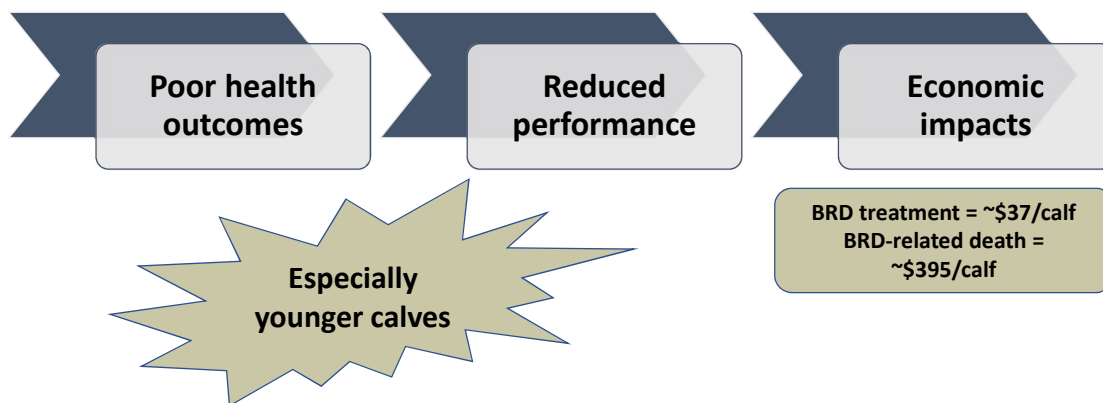
Not including stillbirths

Calves undergoing dystocia are 2 to 15 times more likely to die in the perinatal period



Lombard et al., 2007. JDS 90:1751

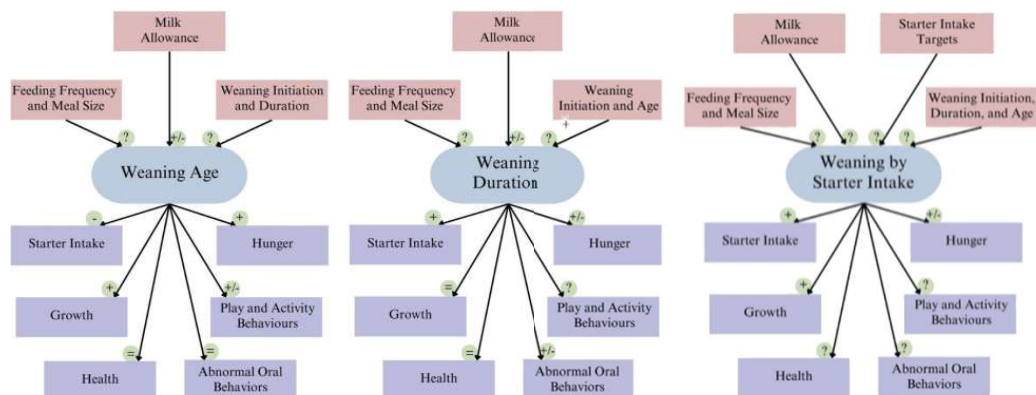
Transportation stress



Weaning stress

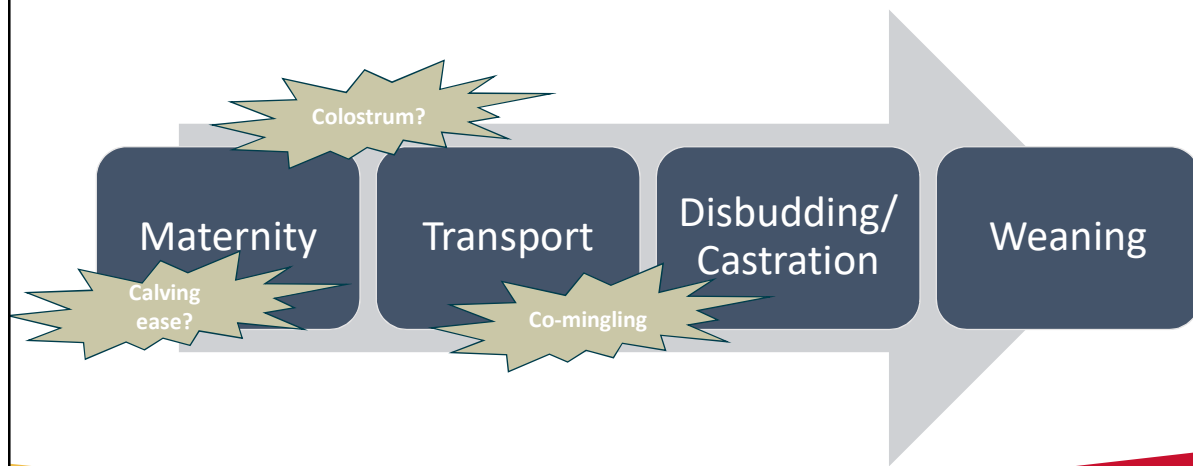


Calf weaning stressors are complex and multivariate



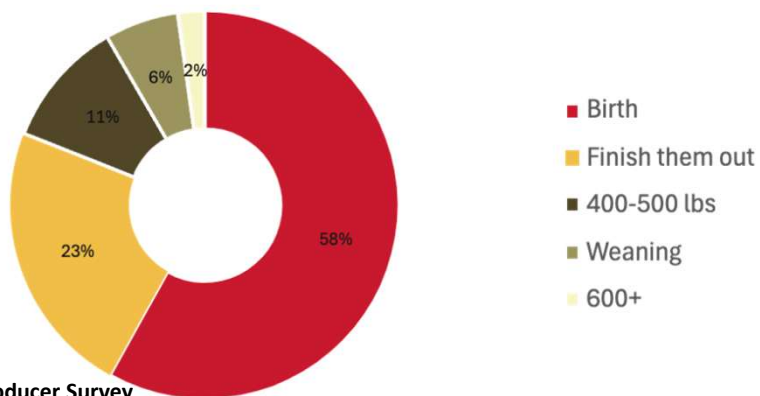
Welk et al., 2024. JDS 107: 5237

Unique challenges for dairy × beef crosses



When do you market your dairy x beef calves?

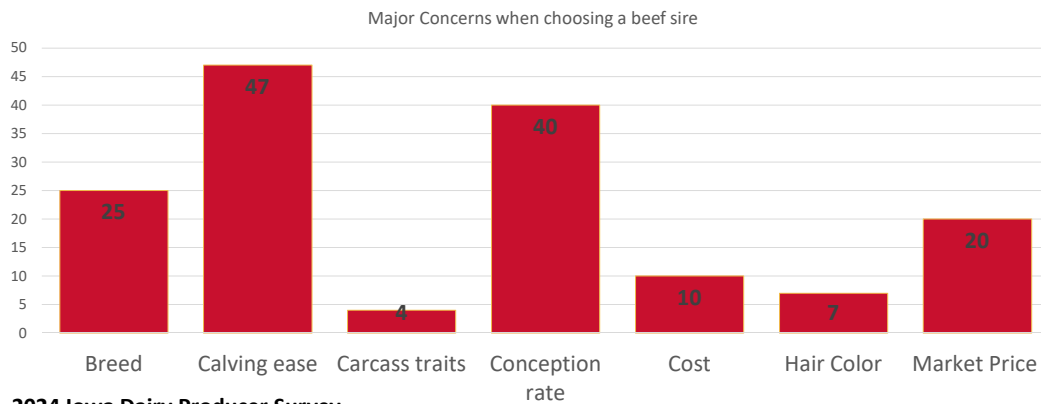
Beef-on-dairy Marketing Timepoints



N=179

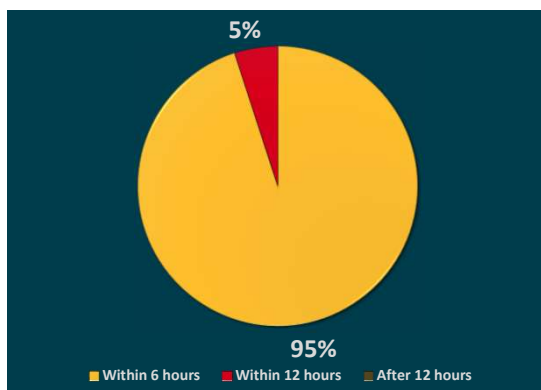
2024 Iowa Dairy Producer Survey

What is your major concern when choosing a beef sire?

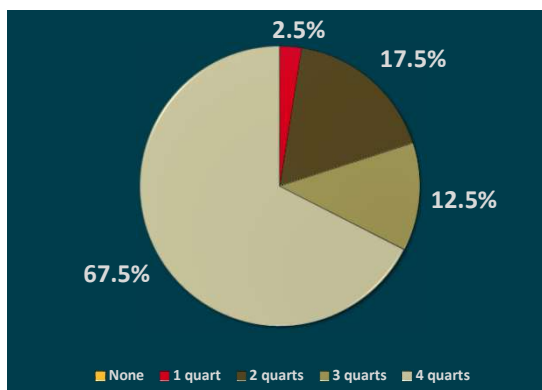


Colostrum feeding practices

How soon after birth is colostrum fed?



What amount of colostrum is provided?



Sterry, 2023. "Beef x Dairy Crossbreeding and Calf Management Practices on Wisconsin Dairy Farms"

Nutritional strategies can mitigate these stressors

When it comes to nutritional strategies, there are options!

Colostrum

**Plane of
Nutrition**

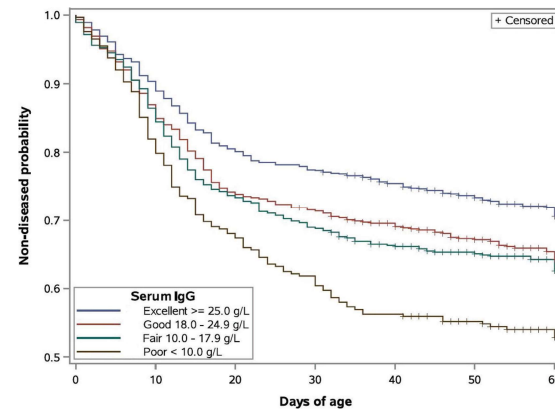
**Step-down
weaning**

Starter

**Supportive
additions**

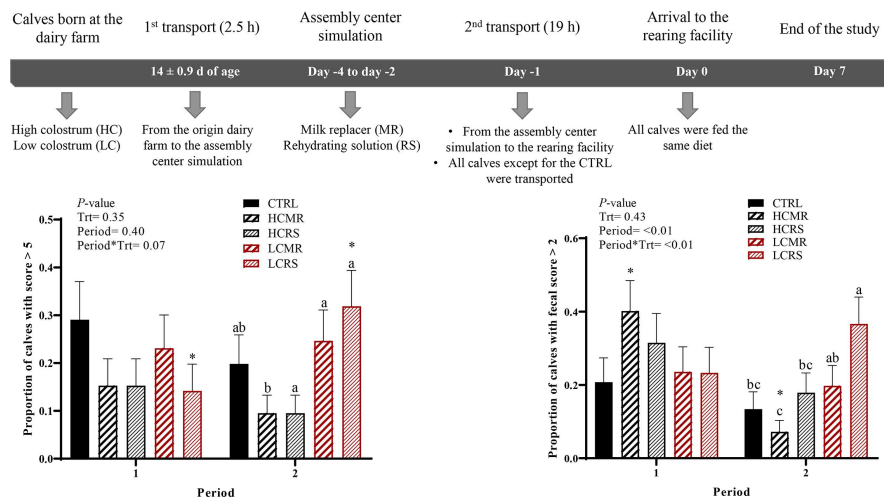
3 Q's? 5 Q's? 4 Q's + C?

- **Quality:** >50g/L IgG, recommended at least 150 grams of IgG at 1st feeding
- **Quantity:** 10-15% of bodyweight within first 18 hours of life
- **Quickness:** First feeding as soon as possible within 2 to 4 hours
- **Quantify:** Measure quality of colostrum using a colostrometer or Brix refractometer
- **Clean:** Make sure all equipment for harvest, storage, and delivery are sanitized for each calf



Lombard et al., 2020. JDS 103: 7611

Colostrum + transportation stress



Pisoni et al., 2023. JDS 106: 9304

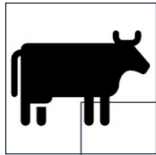
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Plane of nutrition experiments

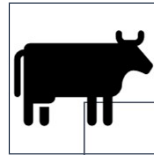
- **Breed:** Some studies focus on Jersey, others on Holstein or mixed.
- **MR composition:** Protein/fat concentrations and dry matter intake targets vary widely.
- **Feeding method:** Programs range from fixed MR volumes (e.g., 0.66 kg/d) to ad libitum and biologically normal intake (e.g., 15 L/d).
- **Duration and step-down strategy:** Some wean at 6 weeks, others at 8+; weaning protocols (gradual vs. abrupt) significantly affect outcomes.
- **Postweaning diets:** High variability in concentrate percentages, energy levels, and dry matter intake targets makes cross-study comparisons difficult.

Plane of nutrition



Pros

- Increased growth pre-weaning
- Increased milk in first lactation

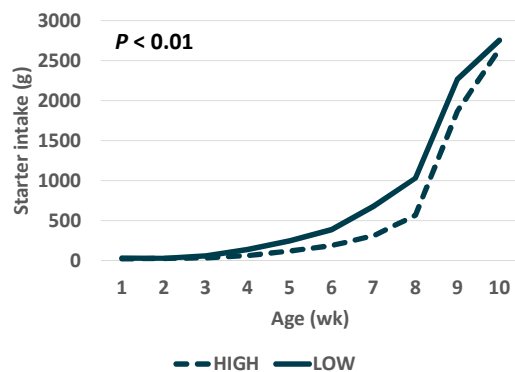


Cons

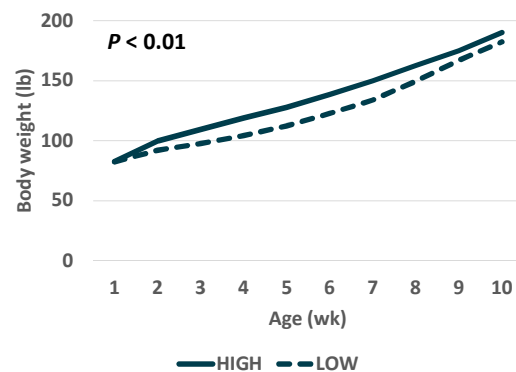
- Lower starter intake
- Post-weaning slump
- Higher fecal scores

Plane of nutrition

HIGH calves were offered 3.9 kg of a 13.5% solids MR solution twice daily, and LOW calves were offered only 2.5 kg of the same solution until weaning at 56 d.



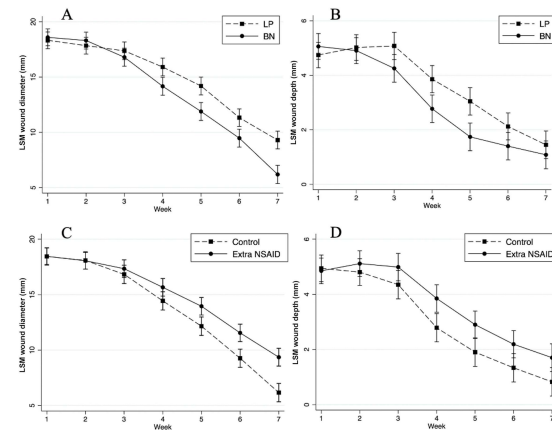
Forgues et al. (in progress)



Plane of nutrition and healing

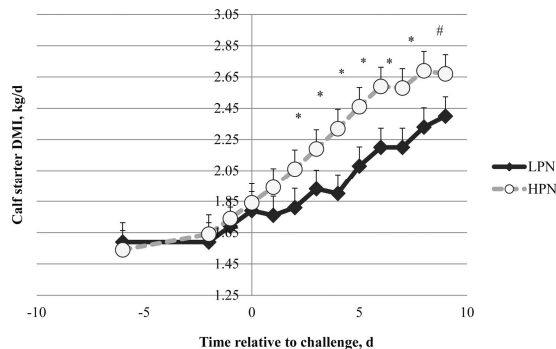
- 2x2 factorial
 - “Biologically normal” (BN): 15 L/d
 - “Limited plane” (LP): 6 L/d
 - Additional NSAID 3 days after disbudding
 - No additional NSAID
- Calves fed 5x daily by Calf Rail
 - Acidified milk replacer
 - Concentration of 150 g/L (5.4 pH, 26% CP, 18% crude fat)

Reedman et al., 2022. JDS 105:6220

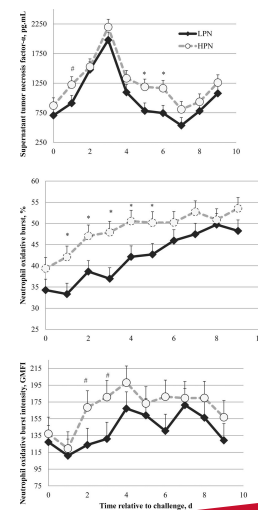


Plane of nutrition and immune function

- LPN: 409 g/d DM of a 20% crude protein/20% fat milk replacer
- HPN: 610 and 735 g/d of DM of a 28% crude protein/25% fat milk replacer during wk 1 and 2 to 6, respectively.
- Challenged with *Salmonella* Typhimurium on d 80.



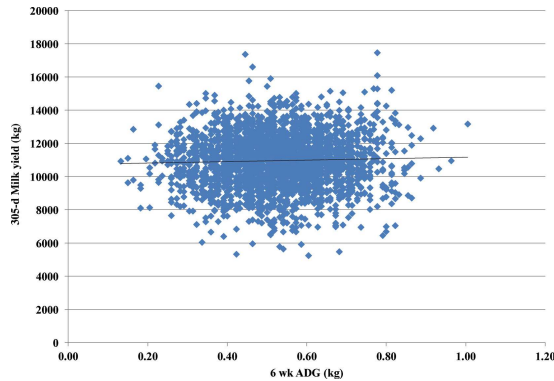
Ballou et al., 2015. JDS 98: 1972



More milk = more milk...?

2,880 Holstein calves from 3 commercial dairies (SROC, MN)

- ↑ BW and ADG at 6 wk, starter intake at 8 wk = ↑ first-lactation milk and milk component yields.
- Seasonal impacts
- High variation



Chester-Jones et al., 2017. JDS 100: 3697

Plane of nutrition + starter intake

How can we take advantage of the benefits of a high plane of nutrition without compromising starter intake & rumen development?

**When it comes to nutritional strategies,
there are options!**

Colostrum

**Plane of
Nutrition**

**Step-down
weaning**

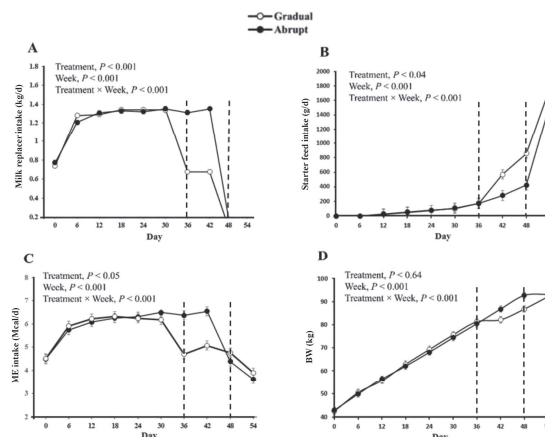
Starter

**Supportive
additions**

Step-down protocols can mitigate downsides of high plane of nutrition

- Abrupt or a gradual weaning protocol before weaning at 48 d of life
 - Abrupt = 0 d step-down
 - Gradual = 12 d step-down
- 4.5 L of milk replacer per feeding (150 g/L resulting in 1.35 kg/d); 26% CP/16% crude fat

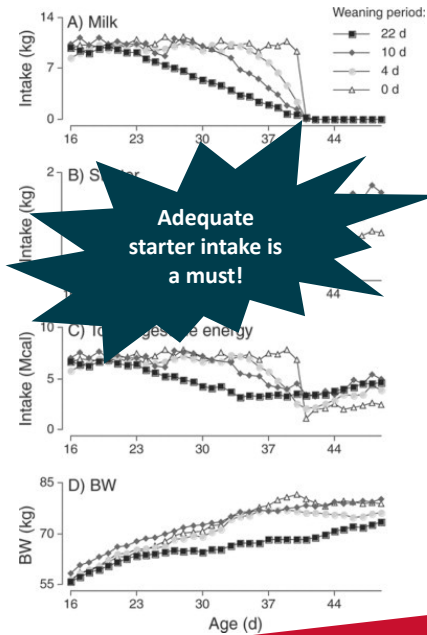
Steele et al., 2017; JDS 100:5390



How long to step-down?

- Calves on autofeeders
- Pasteurized, non-saleable milk at 12 kg/d
- Weaned at 41 d
 - 22 d step-down (began at 19 d)
 - 10 d step-down (began at 31 d)
 - 4 d step-down (began at 37 d)
 - 0 d step-down (abrupt at 41 d)

Sweeney et al., 2010. JDS 93:148



When it comes to nutritional strategies, there are options!

Colostrum

Plane of Nutrition

Step-down weaning

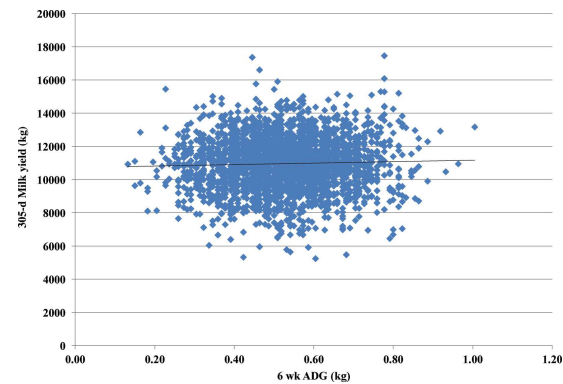
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Supportive additions

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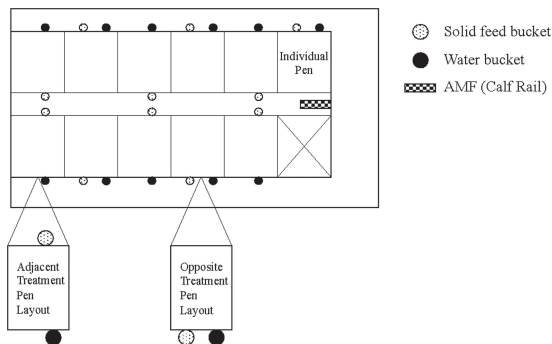
Characteristics of a good starter

- Palatable
 - Frequently refreshed
 - Flavor agents
 - Molasses
- Physical form
 - <5-10% fines
 - Textured or pelleted (if pellet quality is good)

Primary factor determining ruminal development is dry feed intake



Consider placement of starter



Parsons et al., 2020. JDS 103: 6533

When starter was placed next to milk source...

- Consumed 16.7% more solid feed and 0.55 L/d more milk during the preweaning phase
- Consumed more water
- Spent more time consuming solid feed
- Had 10% greater average daily gain during the preweaning phase

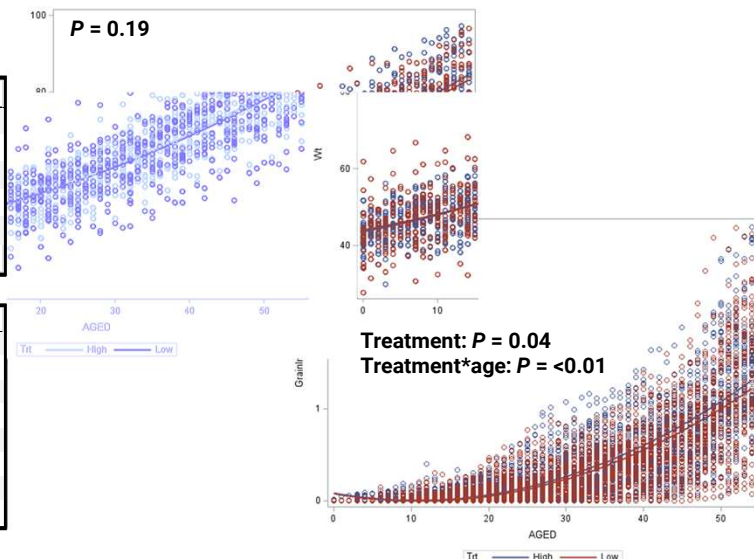
Early-life nutritional impacts on dairy × beef calves

Nutrient (% of DM)	High Starch	Low Starch
Protein	20.4	20.4
Fat	2.4	3.2
Fiber	6.6	11.5
ADF	8.2	14.3
Starch	26.3	15.6

*As balanced, not analyzed

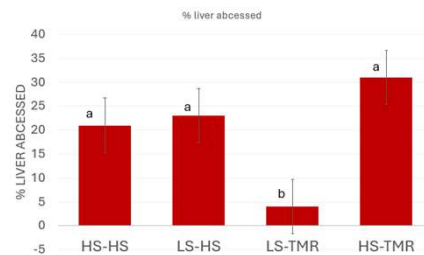
Ingredient (% of DM)	High Starch	Low Starch
Wheat middlings	21.1	35.6
Dehulled soy meal	29.9	23.0
Fine ground corn	33.9	11.4
Cottonseed hulls	5.0	10.0
Sunflower meal		6.0
Cane molasses	4.0	6.0
Soy hulls	1.3	2.5
MinVit mix	4.8	5.6

Klipp et al. (in progress)



Early-life nutritional impacts on dairy × beef calves

- Lower starch diets pre-weaning may impact long-term outcomes
- Biggest impact was from health
 - 2+ respiratory events → ↓ 29-lb carcass weight & ↓ \$91 return



Dahlke et al. (in progress)

When it comes to nutritional strategies, there are options!

Colostrum

Plane of Nutrition

Step-down weaning

Starter

Supportive additions

Consider a boost with these additions

Extended colostrum feeding

- Adding colostrum replacer to milk
- Feeding transition milk

Supplements

- Probiotics: *Saccharomyces cerevisiae*, *Lactobacillus*
- Prebiotics: Mannanoligosaccharides

Electrolytes

- Do not feed instead of milk replacer when supporting stressed calves
- Feed at a different time than milk replacer

Pair good nutrition with best management practices to mitigate stress in calves

Maternity management

- Calving supervision & intervention
 - Mindful intervention + personnel training
 - Use of technology for calving surveillance
- Minimize stress & overcrowding of maternity area
- Maintain cleanliness of environment & equipment

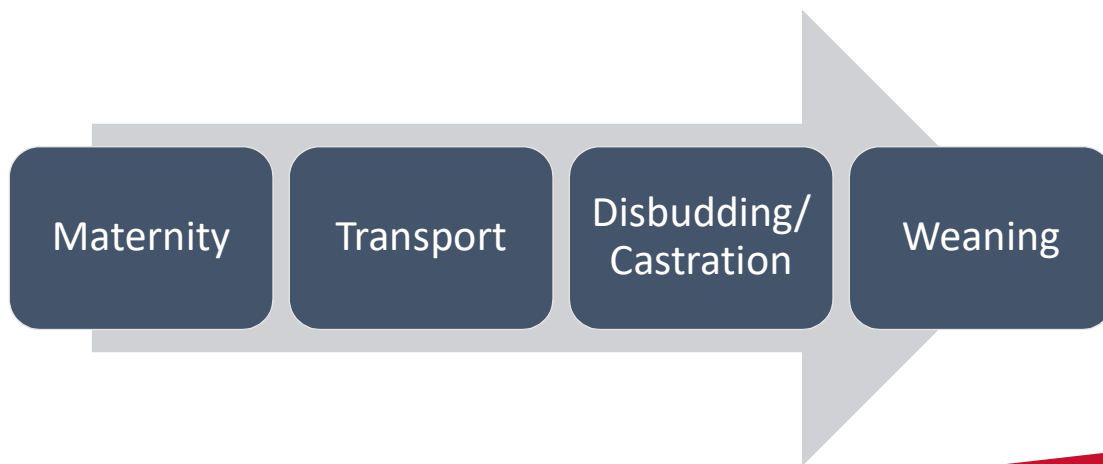


Housing & environment

- Minimize heat stress and cold stress
- Maintain bedding
- Air quality
- Provide water (hot and cold weather)
- Be conscious of social impacts on calves
- Avoid stacking stressors



Calf stressors: A partial overview



Items for action

Tomorrow

- Don't sleep on colostrum
- Ensure calves are hitting adequate starter intake before weaning
- Move starter next to the milk source
- Keep stressed calves hydrated

This season

- Consider gradual weaning if using high plane of nutrition
- Audit maternity routines
- Avoid stacking stressors

Questions?

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