Managing Wagyu for Optimal Beef Quality

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IT’S ALL ABOUT THE BEEF!

IMF % in skeletal muscle including the longissimus dorsi (LM) is the single most important factor determining beef quality.

How does the LM IMF% in breeds compare?

- Wagyu 36.5%
- Holstein/Jersey 17.3%
- Korean Hanwoo 13.7%
- Angus 9.3%
- Hereford 7.6%
- Brahman 2.8%

Average values from 16 publications

Management and Nutritional Factors

Fetal Imprinting

Creep Feeding

Early Weaning

Environmental Stress

Gender

Days on Feed

Harvest Weight/Age

Feeding to Appetite

Starch/Glucose Availability

Natural Protein

Vitamin A

Dietary Fat

Natural Vasodilators

Digestive/Appetite Enhancers

Overcrowding

Grass vs Grain

It all starts with mom!

She takes care of herself, then the calf on the ground, then the calf to come.

Dam Nutritional Priorities

- Maintenance
- Lactation
- Growth (to 4 years of age)
- Reproduction

Peak and Average Milk Production for Common Beef Breeds

Breed	Peak milk lbs/day	Average milk lbs/day
Angus	20.7	14.9
Charolais	21.6	15.1
Hereford	18.7	12.5
Limousin	20.9	14.1
Simmental	24.1	16.8
Avg.	21.2	14.7

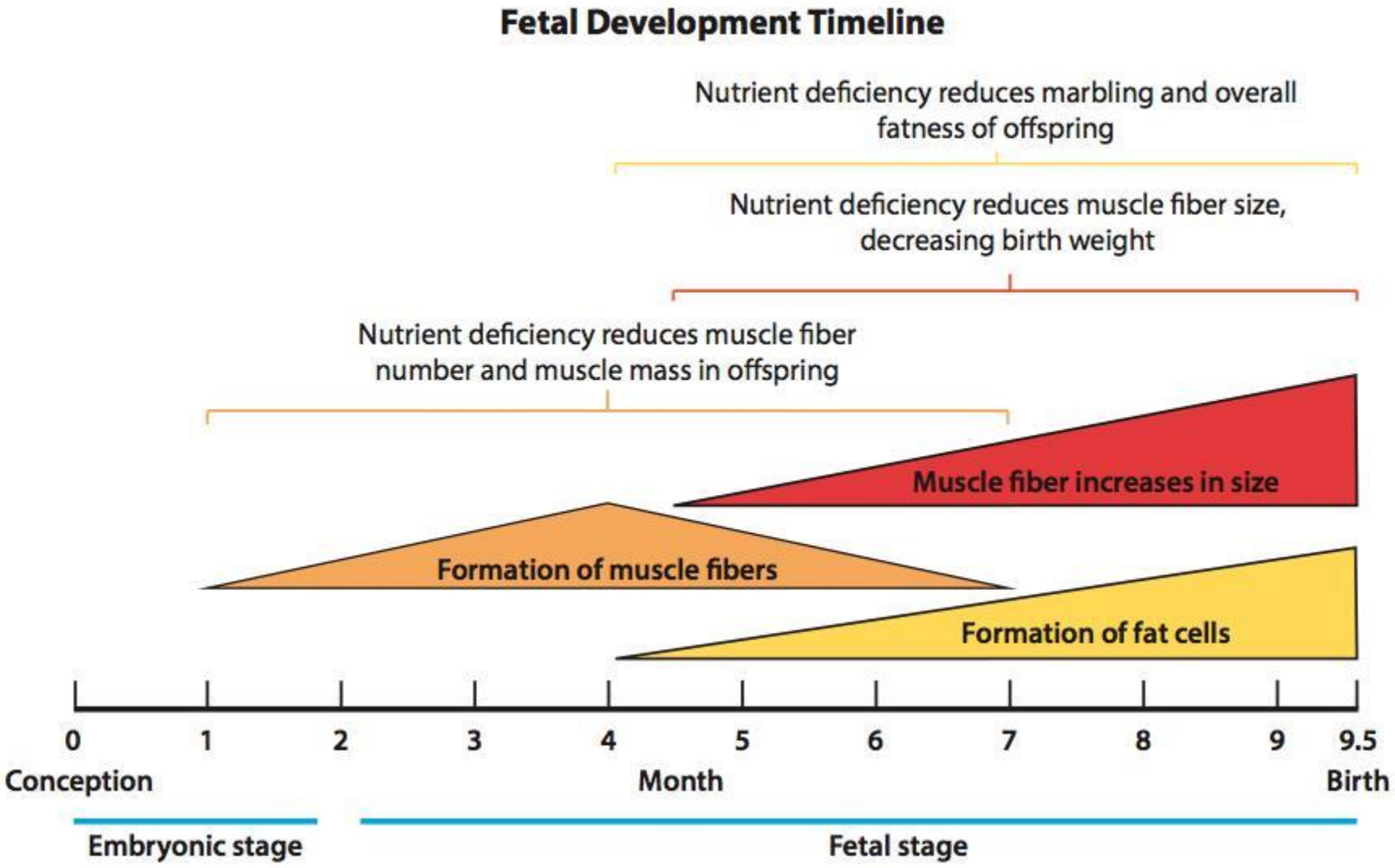
Source: Meat Animal Research Center.

Wagyu Cows	15.5	10.7

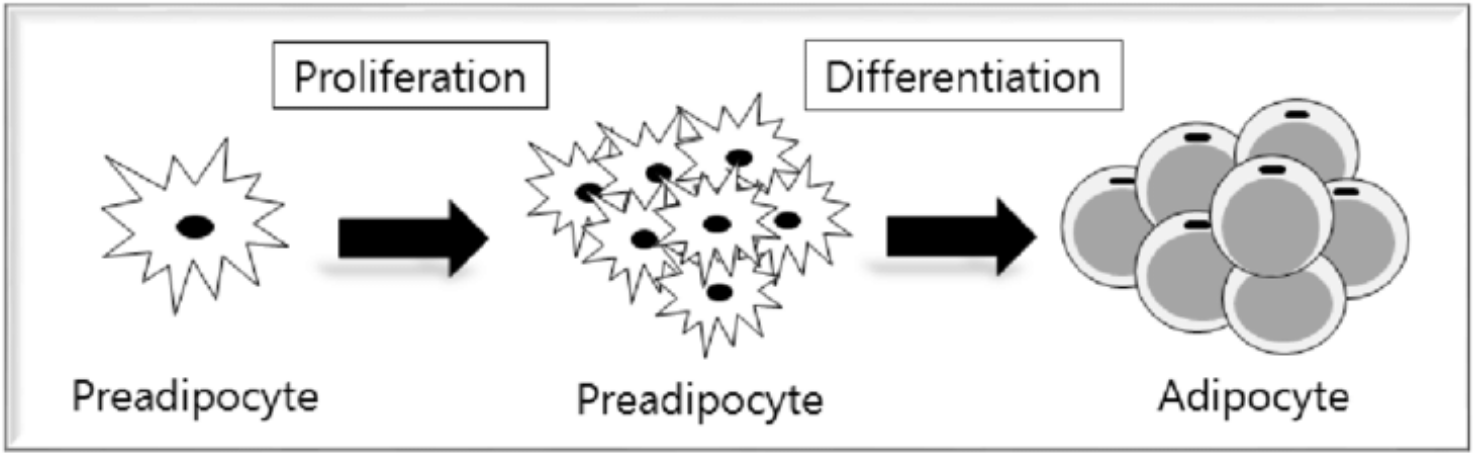
Source: Shingu, H. et.al., 2002; Shimada, K. et. al. 1988.

Fetal Imprinting

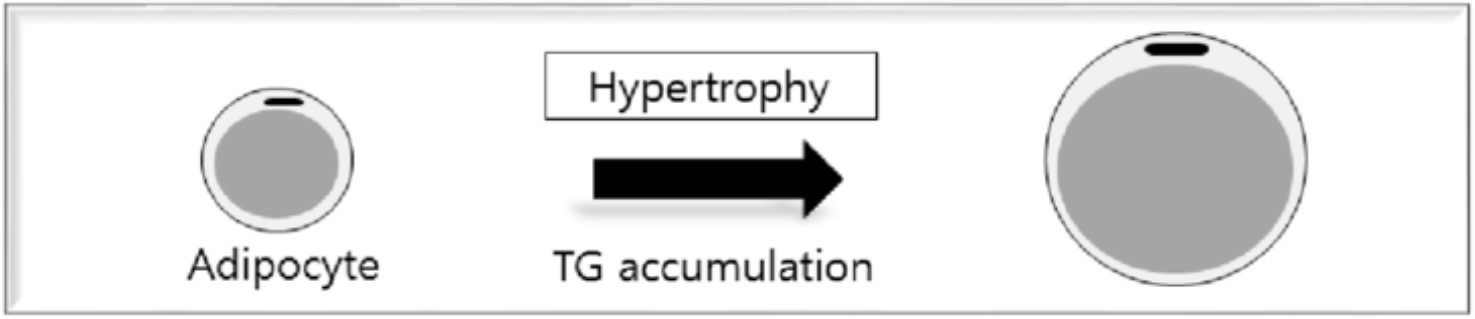
- Mid-late gestation crucial for fetal skeletal muscle development, no increase in no. of muscle fibers after birth.
- Fetal life is a major stage in development of IMF cells (pre-adipocytes). These cells provide eventual sites for IMF accumulation/marbling formation.
  late gestation critical for fetal marbling
- Last 90 days in-utero and 1st 150 days of life can impact up to 50% of final marbling score!!!
- Cow nutrition is directly related to fetal health which affects calf survivability and future growth.
- Colostrum quality is impacted by the last 5 weeks of gestation (BCS, stress, protein, mins/vits) and parity.

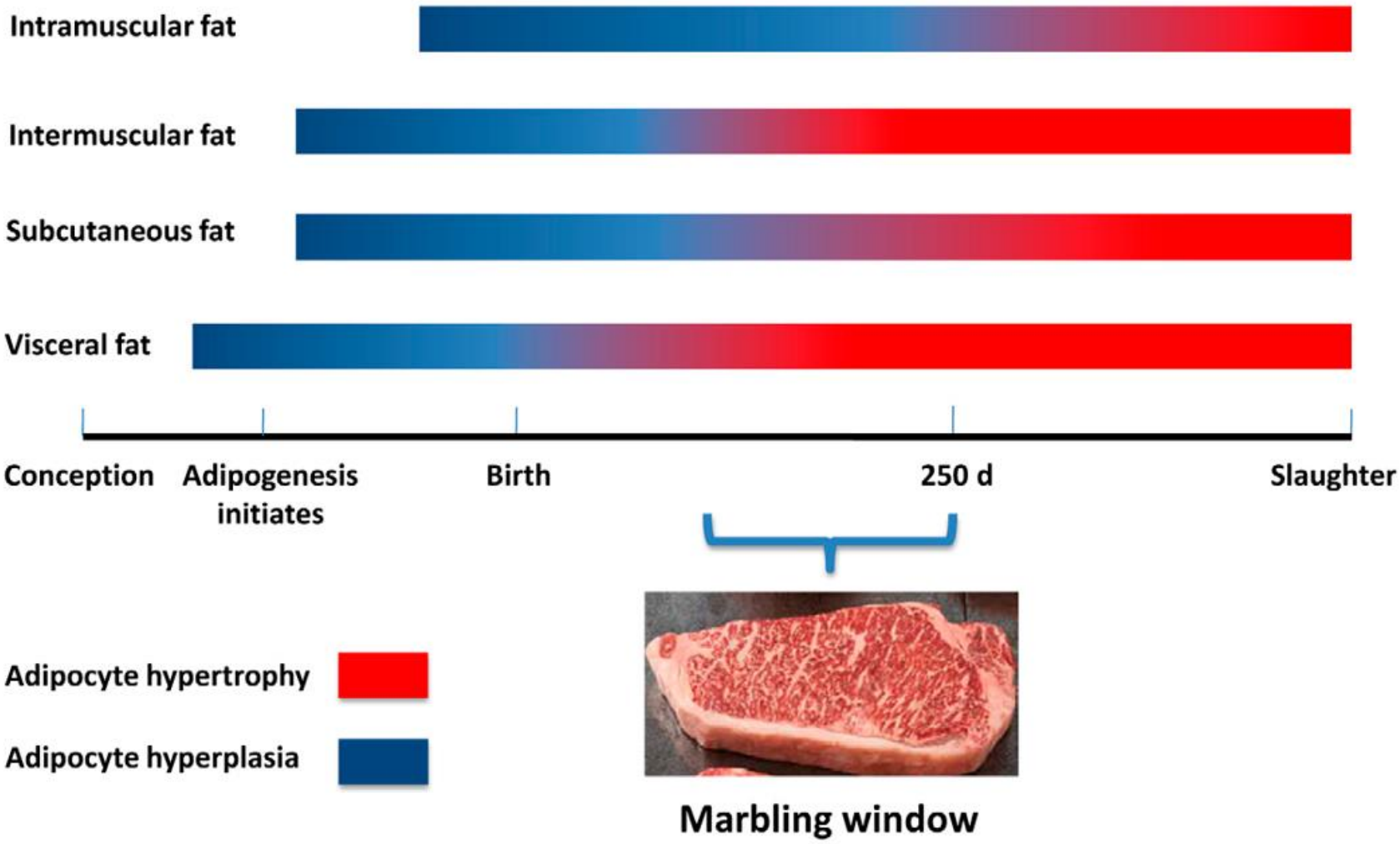

Fetal Development Timeline
Nutrient deficiency reduces marbling and overall fatness of offspring
Nutrient deficiency reduces muscle fiber size, decreasing birth weight
Nutrient deficiency reduces muscle fiber number and muscle mass in offspring
Muscle fiber increases in size
Formation of muscle fibers
Formation of fat cells
0
1
2
3
4
5
6
7
8
9
9.5
Conception
Month
Birth
Embryonic stage
Fetal stage

Hyperplasia : increase in fat cell number

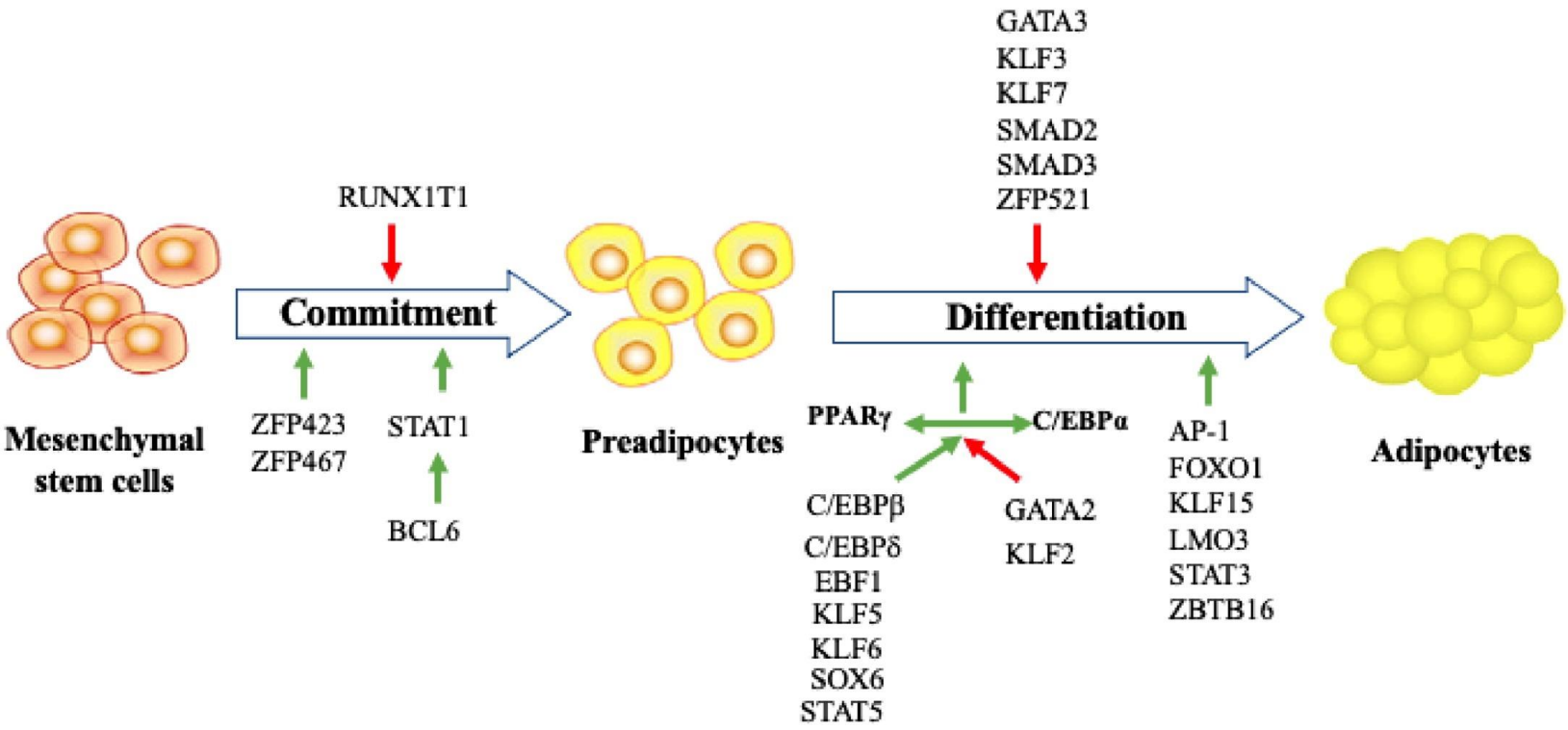


Hypertrophy : increase in fat cell size




Intramuscular fat
Intermuscular fat
Subcutaneous fat
Visceral fat
Conception
Adipogenesis initiates
Birth
250 d
Slaughter
Adipocyte hypertrophy
Adipocyte hyperplasia
Marbling window

Adipogenesis



Marbling

- Marbling is a lifelong process starting 180d post-conception
- Hyperplasia (number) and Hypertrophy (size)
- Marbling window 90d prior to 150d after birth (pre-adipocytes)
- This 240d window impacts up to 50% of lifetime marbling potential
- Adipocyte proliferation (differentiation) begins at 24-25 mos of age in FB Japanese Blacks which results in finer texture
- Wagyu maintain a higher rate and duration of marbling than other breeds
- There is a point of diminishing returns in which IMF deposition is less than that of subcutaneous and internal fat (>1500 lbs & 30+ mos. in Japanese blacks)
- If fed and managed properly, harvest fullbloods at 24-28 mos. and F-1's at 21-24 mos. for optimal quality and yield

Feeding Young Wagyu Stock

- Most efficient stage of life
- High quality and highly palatable feeds
- Wagyu calves on Wagyu dams must be creep fed (NOT OPTIONAL)
- Wean by 4-6 mos. if on Wagyu dams (feed intake most critical)
- Steers and replacement heifers must be separated after weaning
- High protein rations critical for structural development (requirements more similar to dairy breeds)
- Avoid overfeeding & overconditioning replacement heifers
- Future finishing prospects must be pre-conditioned & taught to eat (min 1.5-2.0% of BW in grain consumption prior to finishing)
- Mineral program important here too as 1st limiting nutrient restricts growth and performance, immunity
- **Emphasize feeds with best results not best price**

The 5 C's of a Healthy Start

Colostrum

Calories

Cleanliness

Comfort

Consistency

- **Colostrum**-1st 12 hours critical, provide all calves from fullblood or high percentage 1st calf heifers with colostrum replacer, vaccinate dam for E. coli pre-calving
- **Calories**-focus on milk yield of dam via both genetics & nutrition, offer high quality creep/starter within 1st 3 days, early weaning = higher quality & heavier marbled carcasses
- **Cleanliness**-clean, comfortable & dry calving conditions, good sanitation, fresh feed & water
- **Comfort**-stress impacts efficiency, growth, reproduction & carcass quality more than any other single factor. Post-weaning stress must be minimized. Wagyu have more to lose when uncomfortable.
- **Consistency**-Most challenging of the 5 C's. Top producers in both the U.S. and Japan tend to be more uniform and consistent in their daily approach to husbandry than other operations.

Stress

Stress = lost $$$

- Stress provokes release of adrenalin and adrenalin in turn causes the body to convert fat in IMF cells into readily available energy (glycogen) for the muscles to burst into action, whether that energy is needed or not.
- Adrenaline drains IMF out of cells!
- Can take up to 8-12 weeks for cattle to recover and for stress hormone (cortisol) to return to normal depending on intensity and duration of stress incurred.
- Cattle remember stressful events
- The opportunity to regain any loss in marbling from stress depends on severity and when it occurs.
- Wagyu cattle are the most efficient at depositing IMF yet appear to be highly susceptible to losing it……..

POTENTIAL SOURCES of STRESS

1 – Environment-Heat, Cold, Wind, Humidity, Precipitation, Mud

2 – Physical Discomfort - Pain

3 – Handling – Movements – Trucking

4 – Nutritional Stress-Abrupt changes in feed/ration, feeding times

5 – Fear/Fearful environment

6 – Weaning/Separation Anxiety/New Diet/New World

7 – Disease or injury

8 – Unfamiliar surroundings/Uncertainty

9 – Lack of a consistent routine

10 – Social stress/Competition

11 – Noise/Bright Lights

12 – Excitement/Running

Best Management Practices to help Mitigate Stress

- **Protection from harsh environment** - adequate shelter/structures
- **Low-stress handling** - docile cattle = docile handlers
- **Cattle mindset** - think like cattle, recognize stress triggers
- **Avoid sudden changes** - feed composition and delivery
- **Feed high-quality, properly balanced diets** - forage & water testing
- **Avoid overcrowding** - highly correlated w disease & injury
- **Minimize social stress** - social creatures, move in groups
- **Avoid bright lights and noise** – comfort = profit

Wagyu cattle are not necessarily stressed more easily than other breeds, but they certainly have more to lose when stress occurs.

MATRIX® Cold Stress Study

Objective: To determine the effect of severe cold stress on marbling score in 71 Wagyu x Angus F1 heifers with and without Matrix.

MATRIX	**CONTROL**	Carcass Parameter
469[a]	**406[b]**	Marbling Score after blizzard-like weather
15.5		Marbling score, % increase
507	**460**	Pen mates marbling score 14d earlier
10.2		Marbling score, % increase
38	**54**	Marbling score, unit loss
7.5	**11.7**	Marbling score, % loss

a,b – means with different superscripts are significantly different at P<.053

* 40 day feeding trial with heifers (1300 and 1400 lbs)
* On feed for 423 days and harvested at approx. 22.5 months of age
* Exposed to blizzard-like conditions during the final 14 days pre-harvest (Mean temp 22˚F with a low of 8˚, mean wind speed 17mph with a high of 43 mph, rain and snow accumulation, no shelter)
* 80 pen mates (40 on each treatment) had been harvested 14 days earlier with avg. marbling scores of 507 (MATRIX) and 460 (CONTROL)
* Study conducted at A to Z Feeders Atlantic, Iowa

Summary: **Severe cold stress was highly detrimental on marbling of Wagyu x Angus feedlot heifers with a resulting loss of 11.7% in marbling score (Control)** and 7.5% (Matrix) during the final 14 days pre-harvest. Feeding Matrix in cold stress conditions prevented 36% of potential loss in marbling and resulted in an overall higher marbling score of 15.5% over the final 40 days pre-harvest (P<.053).

One of the best means of optimizing beef quality, enhancing feed efficiency, and reducing the days on feed required to reach weight and quality targets is to MINIMIZE STRESS…


Lely Juno
LELY
0006

Cross section

r	V+Wagyu
en at	2023-06-13 10:17:38
y no.	28111
	62.94%
2	10.00
(in2)	16.69
	18.57

Wagyu Finishers

Finishing Wagyu Cattle
Phase 1

- Start calves on finishing program at 9-12 months of age (600-700 lbs)
- Calves should be pre-conditioned or adapted to Phase 1 finisher ration (10-20 months of age)
- Feed a good quality and palatable grass or small grain hay or haylage at 1% of BW
- Feed a nutritionally balanced, palatable finisher grain at 2% of BW
- Feed a TMR at 2.5-3.0% of BW

Finishing Wagyu Cattle
Phase 2

- Move calves to Phase 2 Finisher at 20-21 months of age
- Feed a nutritionally balanced Phase 2 finisher grain at 2.0-2.25% Of BW
- Feed average quality grass or small grain hay or straw at 0.5-.75% of BW. Hay must be 6 months old to minimize vitamin A intake. Avoid alfalfa hay or anything green during this phase.
- Minimize activity (energy expenditure = marbling loss)
- Harvest fullblood/high percentage calves at 24-28 mos. and F-1's at 21-24 mos. of age or around 1400-1500 lbs based primarily on feed intake and days on feed, not backfat nor strictly age.
- Avoid excessive ADG to maximize quality? Depends……

Recommended Minimum Grain Nutrient Levels

Nutrient	Starter	Grower	Finisher 1	Finisher 2
Crude Protein %	18	16	15	14
TDN %	72	74	75	76
NEg, Mcal/lb	.50	.52	.54	.56
IU Vit A per day	40,000	30,000	25,000	0
IU Vit E per day	150	300	500	1000

***NOTE: Crude Protein and TDN need to be slightly higher for heifers fed out for beef as they are less efficient converting these nutrients to weight gain than steers.**

Nutrient	Alfalfa Hay	Grass Hay
Dry Matter %	90	90
Crude Protein %	20	10
ADF %, max	30	45
NDF %, max	40	75
RFV	150	75

Vitamin A and Marbling

- A common feeding practice of Japanese finishers is removal of vitamin A after 18 mos., restricted at 13-18 mos.
- Removal should occur no later than 23 mos. of age
- Studies in Japan (Hashimoto) and U.S. (Flaherty) have shown as much as 30% difference in marbling with vitamin A removal
- 3 out of 4 studies done since 2003 indicate no vitamin A supplementation for min. of 90d pre-harvest improved quality grade significantly
- Feeding vitamin A restricted diets requires good mgmt and should not exceed 10-12 mos. in most cases
- Avoid alfalfa and lush pasture during vitamin A devoid phase
- High vit E and natural vasodilators help maintain immunity and efficiency during vitamin A devoid phase

Summary

- Take advantage of fetal imprinting
- Start your calves off right with the 5 C's: Colostrum, Calories, Cleanliness, Comfort, and Consistency.
- Wean Wagyu calves on Wagyu dams as early as possible (4-6 mos, 2-2.5 lbs of starter/day).
- Variety of ways to enhance carcass quality ie. taking care of mom (last trimester critical), creep feeding, early weaning, properly-balanced diet, restricting vitamin A, and minimizing stress.

PROTOCOL Naturals

PROTOCOL FARMS

PROTOCOL TECHNOLOGIES