2026 Dairy Skillathon Study Guide and Resources

DAIRY CATTLE BREEDS

Ayrshire

- Originated in Scotland
- Originally known as the Dunlop
- Color: red and white
- Good feet and legs
- Excels in udder conformation
- Medium-sized frame
- Recent problems with “Curly Calf” (Bulls that transmit – Autograph & Calimero)
- Magazine: The Ayrshire Digest
- Breed association located in Columbus, OH

Brown Swiss

- Originated in Switzerland
- Foot and mouth disease has caused only 3 to be imported since 1906
- Good temperament and strong feet and legs
- Color: gray or light brown to dark brown
- Magazine: The Brown Swiss Bulletin
- Association located in Beloit, WI

Guernsey

- Originated from the Isle of Guernsey
- Known for high quality (high fat and protein content) milk while consuming less feed
- Intermediate frame
- Known for milk to have a golden color
- Magazine: The Guernsey Breeder's Journal
- American Guernsey Association located in Columbus, OH

Holstein

- Originated in Europe
- Largest frame size
- Color: black and white
- Known for outstanding milk production
- Magazine: The Pulse
- USA Holstein Association located in Brattleboro, VT

Jersey

- Originated from the Isle of Jersey (small British isle)
- Color: very light gray to dark brown or almost black
- Smallest framed
- Known for high milk fat
- Magazine: The Jersey Journal
- American Jersey Cattle Association located in Reynoldsburg, OH

Milking Shorthorn

- Originated in England
- Color: red, white, red and white, roan
- Most versatile of all breeds: good producers, good temperament, good calves, good frame
- Dual breed- a breed in both dairy and beef
- 1st Breed imported to the US ("Durhams")
- Magazine: The Angle
- American Milking Shorthorn Society located in Beloit, WI

Red and White

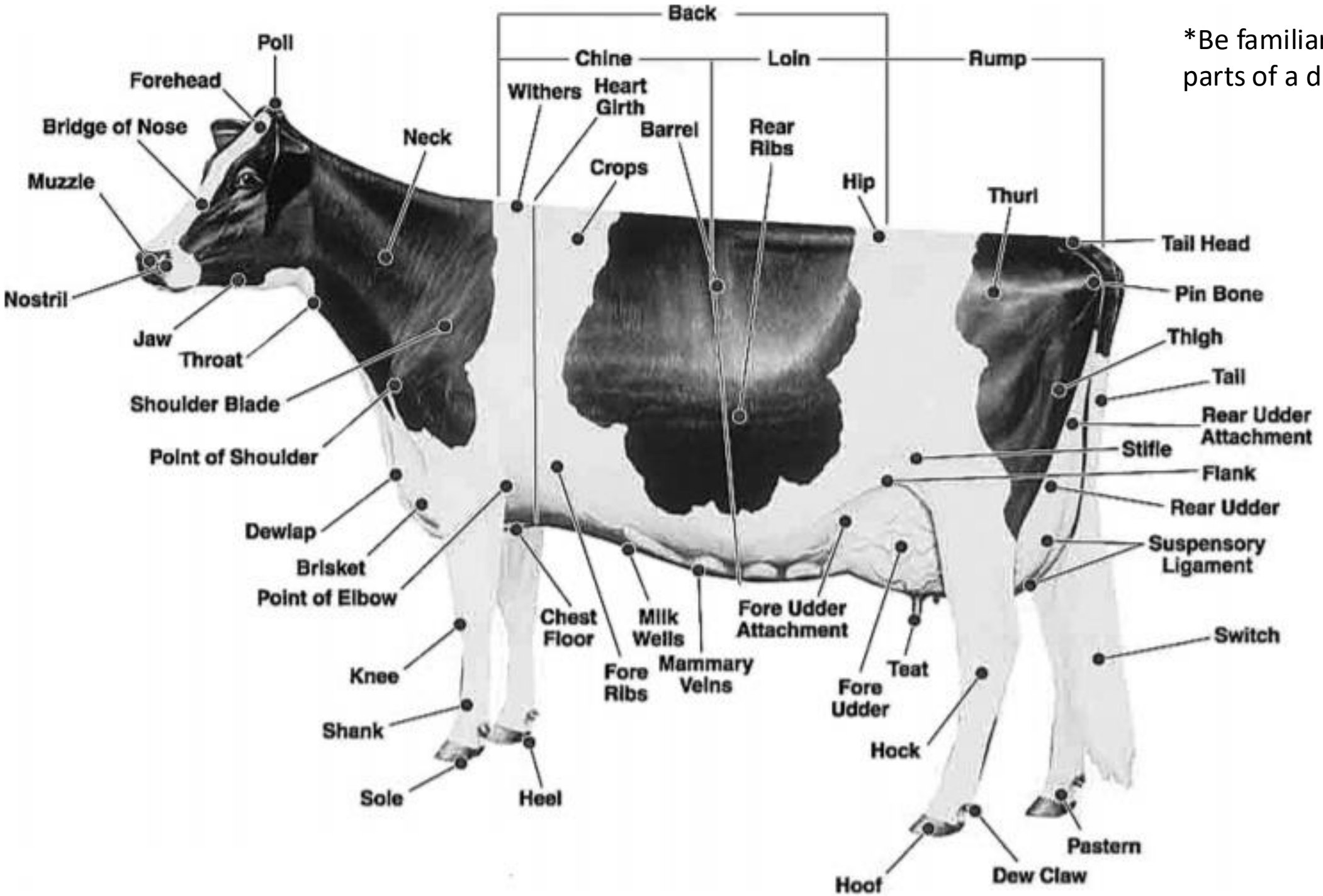
- Can have genetics from several different breeds- most are Holstein, but can have genetics from other cattle that have reddish coats (Milking Shorthorn or Ayrshire)
- The color red is a natural variation and caused by the expression of recessive genes
- Established in 1964 by a group of Shorthorn cattle breeders looking to make improvements to Shorthorn milk production
- Magazine: The Red Bloodlines
- Red and White Dairy Cattle Association located in Watertown, WI

Notable Animals

- Brown Swiss Milk Production Leader: Lost Elm Prelude Pixy ET (65,430 lb.)
- Holstein Milk Production Leader: Selz-Pralle Aftershock 3918 (78,170 lb.)
- Jersey Milk Production Leader: Mainstream Barkly Jubilee (55,590 lb.)
- World lifetime milk production record holder: Gillette E Smurf
- 1st Bull to Produce 1-million units of semen: Fisher-Place Mandingo-TW
- 2025 Supreme Champion of WDE: Golden-Oaks Temptress-Red (Red and White)

DAIRY COW ANATOMY

*Be familiar with all parts of a dairy cow



QUALITY ASSURANCE

Medication Insert

Name of Drug

OMNIBIOTIC

(Hydrocillin in Aqueous Suspension) — *Active Ingredients*

For use in Beef Cattle, Lactating and Non-Lactating Dairy Cattle, Swine and Sheep — *Species and Animal Class*

Read Entire Brochure Carefully Before Using This Product

For Intramuscular Use Only

Active Ingredients: Omnibiotic is an effective antimicrobial preparation containing hydrocillin hydrochloride. Each ml of this suspension contains 200,000 units of hydrocillin hydrochloride in an aqueous base.

Approved Uses

Indications: Cattle - bronchitis, foot rot, leptospirosis, mastitis, metritis, pneumonia, wound infections. **Swine** - erysipelas, pneumonia. **Sheep** - foot rot, pneumonia, mastitis: and other infections in these species caused by or associated with hydrocillin-susceptible organisms.

Recommended Daily Dosage

The usual dose is 2 ml per 100 lb of body weight given once daily. Maximum dose is 15 ml/day.

Dosage

Body Weight	*Dosage*
100 lb	2 ml
300 lb	6 ml
500 lb	10 ml
750 lb or more	15 ml

Continue treatment for 1 to 2 days after symptoms disappear.

Route of Administration

Cautions and Warnings

Caution: 1. Omnibiotic should be injected deep within the fleshy muscle of the neck or thigh. Do not inject this material in the hip or rump, subcutaneously, into a blood vessel, or near a major nerve because it may cause tissue damage. 2. If improvement does not occur within 48 hours, the diagnosis should be reconsidered and appropriate treatment initiated. 3. Treated animals should be closely observed for at least 30 minutes. Should a reaction occur, discontinue treatment and immediately administer epinephrine and antihistamines. 4. Omnibiotic must be stored between 2° and 8° C (36° to 46° F). Warm to room temperature and shake well before using. Keep refrigerated when not in use.

Storage Requirements

Warning: Milk that has been taken from animals during treatment and for 48 hours (4 milkings) after the last treatment must not be used for food. The use of this drug must be discontinued for 30 days before treated animals are slaughtered for food.

Withholding Times

Sizes Available

How Supplied: Omnibiotic is available in vials of 100 ml.

*Be familiar with all areas on a medication insert

Medication Label

*Be familiar with all areas on a medication insert

Name of Drug

OMNIBIOTIC

(hydrocillin) — *Active Ingredients*

Directions for use: See package insert

Cautions and Warnings

Warning: The use of this drug must be discontinued for 30 days before treated animals are slaughtered for food. Exceeding the highest recommended dosage level may result in antibiotic residues in meat or milk beyond the withdrawal time. — *Withholding Times*

Store between 2° and 8° C (36° and 46° F) — *Storage*
Keep dry and keep away from light

Quantity of Contents

Net Contents: 100 ml

TAKE TIME

OBSERVE LABEL DIRECTIONS

Distributed by
USA Animal Health, Inc. — *Name of Distributor*

Injection Acronyms

- IM: Intramuscular injection (into the muscle of the animal)
  - Sites of administration: neck or thigh
- IV: Intravenous injection (into the vein/bloodstream of the animal)
  - Sites of administration: jugular vein (neck) or mammary vein
- SQ: Subcutaneous injection (under the skin of the animal)
  - Sites of administration: under neck skin

DISEASES

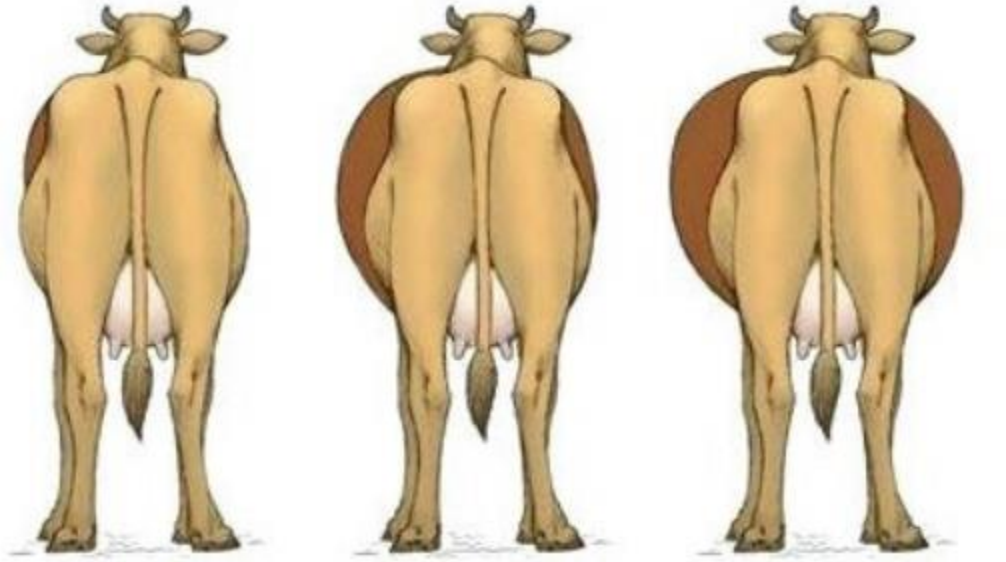
Acidosis

- Metabolic disease
- pH of rumen falls to less than 5.5 (normal is 6.5 to 7.0)
- When pH falls: rumen stops moving (depresses appetite and production) and acid-producing bacteria take over the rumen
- Causes: feeding a high level of rapidly digestible carbohydrate (feeding increased concentrates compared to forage)
- Symptoms: reduced feed intake, diarrhea, lethargy
- Prevention: reduce amount of readily fermentable carbohydrate consumed at each meal


https://www.dsm-firmenich.com/anh/challenges/supporting-animal-health/rumen-acidosis.html

Bloat

- Increase in the gas pressure within the rumen
- Cause: consumption of lush legume pasture species in the spring
- Symptoms: off feed, reluctant to move, appear distressed, rapid breathing
- Prevention: pasture management



https://trumbull.osu.edu/

Bovine Papillomavirus

- “Warts”
- Contagious, virus induced skin growths
- Spread through direct contact and improperly disinfected equipment
- Treatment: Warts tend to disappear on their own after 6 to 18 months
- Prevention: isolate infected animals, maintain strict hygiene, and sanitize equipment regularly

Bovine Spongiform Encephalopathy

- **“Mad Cow Disease”**
- A fatal progressive brain disease that affects cattle
- Cattle become infected by eating feed contaminated with prions
- Symptoms: abnormal behavior (nervousness/aggression), difficulty walking/standing up, weight loss, noticeable loss of appetite
- No treatment or vaccine

https://www.fda.gov/animal-veterinary/animal-health-literacy/all-about-bse-mad-cow-disease

Coccidiosis

- Commonly a disease of young cattle (1-2 months to 1 year)
- Usually sporadic during the wet seasons of the year
- Most characteristic sign is watery feces
- Infected calves should be removed from the rest

https://www.farmersjournal.ie/beef/management/grazing-coccidiosis-and-thin-cows-358736

Cryptosporidiosis

- Caused by infection with a single-celled parasite
- Symptoms: diarrhea (watery and loose), colic, depression, loss of appetite and weight loss
- Treatment: none; Fluid therapy and nutritional support
- Prevention: separate infected calves from healthy calves, good sanitation practices


https://calfcare.ca/management/cryptosporidium

Edema

- Swelling, usually of the udder
- Usually immediately after calving in the udder
- Most common in first lactation heifers

Foot Rot

- Common, infectious, and painful bacterial infection
- Symptoms include swelling of the foot, foul odor, lameness, fever, and reduced milk production
- Treatment: antibiotics, topical care, hoof treatment
- Prevention: keep cattle in dry environments, use footbaths, proper nutrition and mineral supplementation


https://www.beefmagazine.com/

Hardware Disease

- General term used to describe a situation where a piece of metal has been swallowed and then collects in and/or pierces the reticulum
- A magnet may be added to prevent this disease

https://www.beefmagazine.com/cattle-disease/prevention-is-the-best-strategy-in-hardware-disease

Heat Stress

- Ideal environment for dairy cattle: 25 – 65 °F
- Methods to cool cows
  - Shade
  - Air exchange/movement
  - Access to water
  - Sprinkler/soaker

https://www.zinpro.com/resource-center/blog/summer-strategies-managing-heat-stress

Hypocalcemia

- “Milk Fever”: Metabolic disease caused by a low blood calcium level
- Symptoms: dry muzzle, cold legs and ears, constipation, drowsiness
- Treatment: replenish cow with calcium solution
- Prevention: adequate feeding practices; feeding lower amounts of calcium during the dry period; feeding a negative anion diet (DCAD diet) during the dry period.

https://www.resco-global.com/en/blog/milk-fever-in-cows-everything-you-need-to-know-including-most-recent-research

Johne's Disease

- **Mycobacterium avium subspecies paratuberculosis (MAP)**
- A contagious infectious bacterial disease that is usually fatal
- Affects the small intestine of ruminants
- Symptoms: weight loss, diarrhea, reduced milk production, swelling under the jaw, roughening of hair coat
- Passed through colostrum, feces, feed, and water that is contaminated
- Asymptomatic until second or third lactation
- No treatment or vaccine


https://johnes.org/johnes-disease-a-to-z/

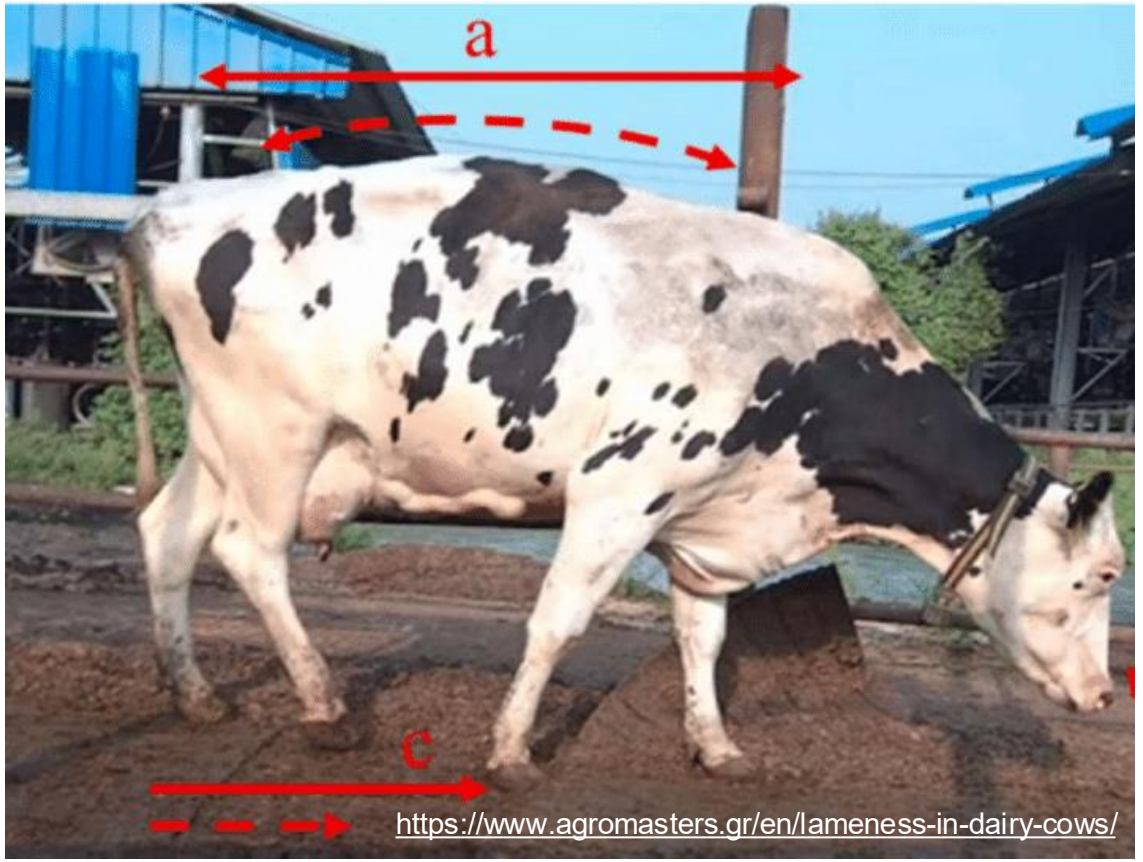
Ketosis

- Metabolic disorder that occurs when energy demands exceed energy intake and result in negative energy balance
- Low blood glucose concentrations
- Most common in first few weeks of lactation
- Symptoms: reduced milk yield, weight loss, reduced appetite, acetone smell on breath
- Prevention: adequate feeding practices

https://www.nddb.coop/farmer/animal-health/disease/post-calving-diseases/ketosis

Lameness

- Due to injury or disease in the foot or leg (laminitis, claw disease, digital dermatitis, and foot rot)
- Symptoms: pain and discomfort, lowered milk yields
- Prevention: hoof trimming, nutrition, housing and environment



https://www.agromasters.gr/en/lameness-in-dairy-cows/

Mastitis

- Inflammation or infection of the mammary gland
- Symptoms: udder is swollen, hot, hard, red, and painful. Milk is watery and has flakes or clots present. Reduced milk yield, increase in body temperature, lack of appetite
- Prevention: good housing management, effective teat preparation and disinfection, regular testing and maintenance of milking machine, vaccination for environmental mastitis

https://www.nadis.org.uk/disease-a-z/cattle/mastitis

https://www.addl.purdue.edu/

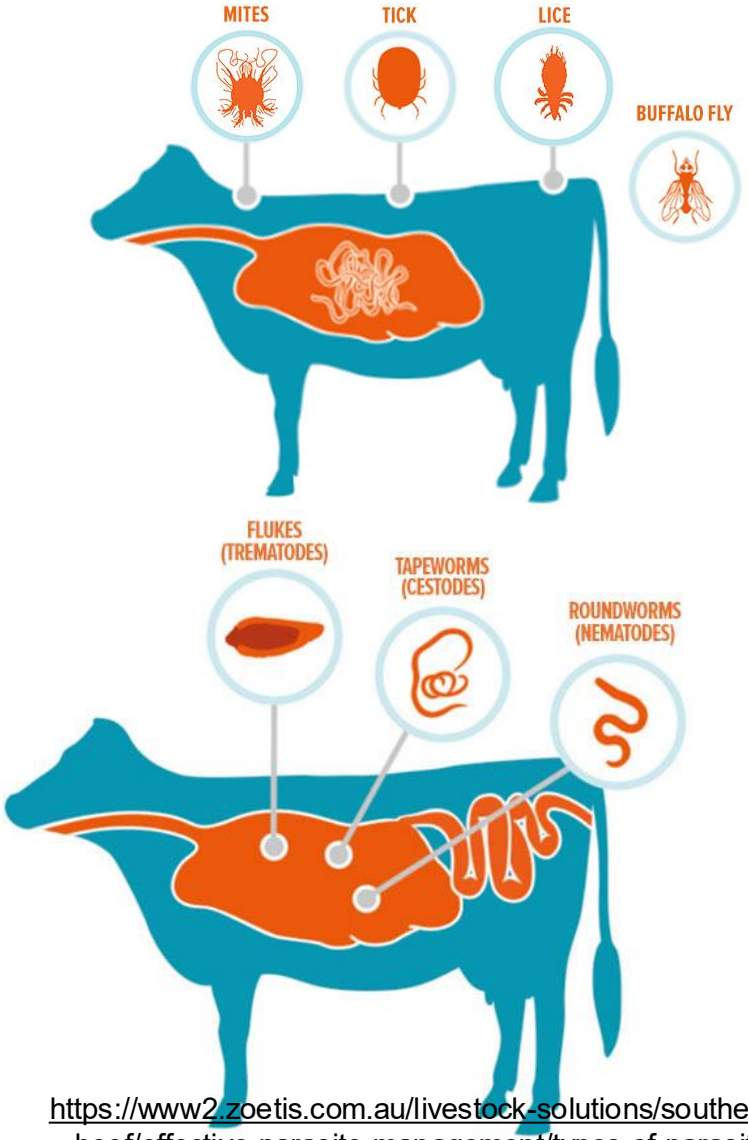
Metritis

- Inflammation of the uterus
- Caused by a bacterial infection
- Usually occurs after calving complicated by dystocia, retained fetal membranes, twins or stillbirths
- Symptoms: fever, vaginal discharge, uterus contains extra fluid, cow goes off feed


https://www.lancasterfarming.com/farming-news/dairy/

Parasites

- Internal Parasites
  - Lung worms, roundworms, stomach worms, liver flukes, coccidia
  - Brown stomach worm: most economically detrimental parasite to cattle
- Flies
  - House fly, face fly, heel fly, stable fly, horn fly, deer fly
  - Face Fly: spreads pinkeye
  - Heel Fly: grubs and warbles
- Preventative Measures: fly sprays, deworming, manure and pasture management practices



https://www2.zoetis.com.au/livestock-solutions/southern-beef/effective-parasite-management/types-of-parasites

Pneumonia

- One of the most common diseases in dairy calves from birth to weaning
- Symptoms: fever (rectal temperature over 103 degrees Fahrenheit), rapid respiratory rate, coughing, nasal discharge
- Prevention: Colostrum management, ventilation, vaccination, nutrition

https://www.nadis.org.uk/disease-a-z/cattle/calf-management/respiratory-disease-in-dairy-and-beef-rearer-units/

Pinkeye

- Inflammation of clear outer layer of eye (cornea) and the pink membrane lining the eyelids
- Highest during the summer
- Symptoms: sensitivity to light, redness of eye, reduced feed intake
- Prevention: fly control, providing shade, reduce overcrowding


https://fieldreport.caes.uga.edu/news/pinkeye-leaving-mark-on-cows/

Ringworm

- A contagious disease caused by a fungus that can be easily spread to other animals
- It invades the hair follicles and outer layer of the skin
- Ringworm is a zoonotic disease, meaning it can be transmitted to human and animals

https://www.nadis.org.uk/disease-a-z/cattle/calf-management/ringworm/

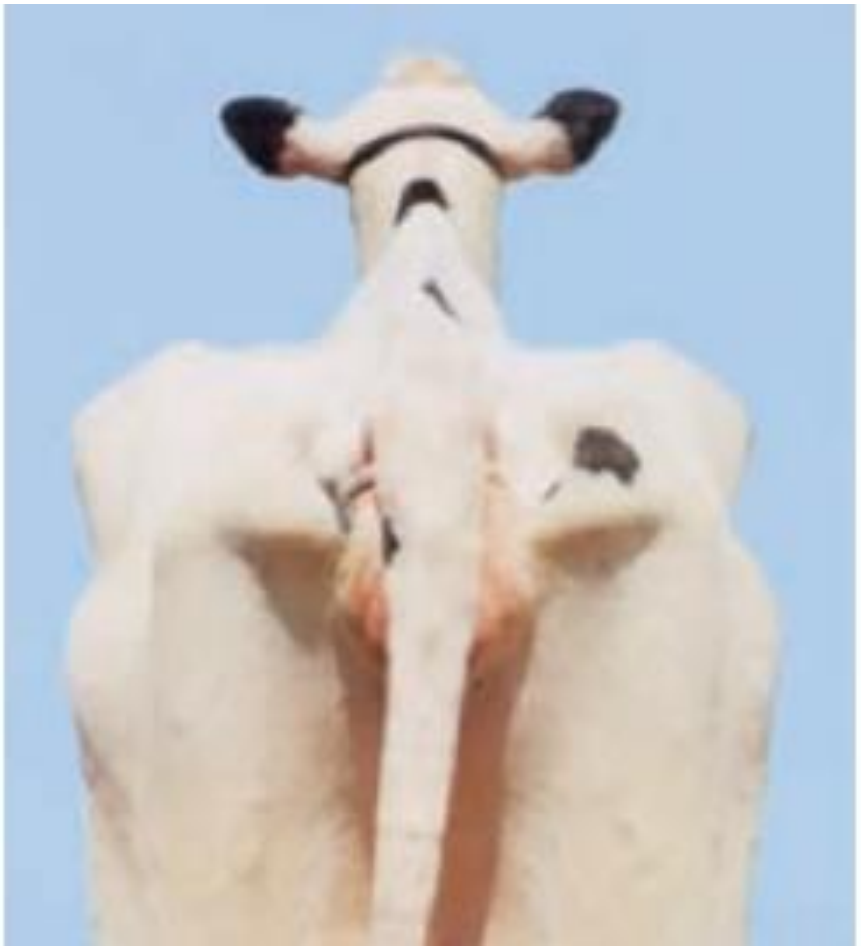
BODY CONDITION SCORING

5 Point Scale with .25 increments

1. Backbone noticeable, hips and shoulder bones noticeable, ribs clearly visible, tail-head area sunken, skeletal body outline
2. Backbone visible, hips and shoulder bones visible, ribs visible faintly, tail-head area slightly sunken, body outline bony
3. Hip bones visible faintly, ribs generally not visible, tail head area not sunken, body outline almost smooth
4. Hip bones not visible, ribs well covered, tail head area slightly lumpy, body outline rounded
5. Hip bones showing fat deposits, ribs very well covered, tail head area very lumpy, body outline bulging due to fat

*Follow the link for more information: https://www.youtube.com/watch?v=FZJat_LIB6c

BCS 1

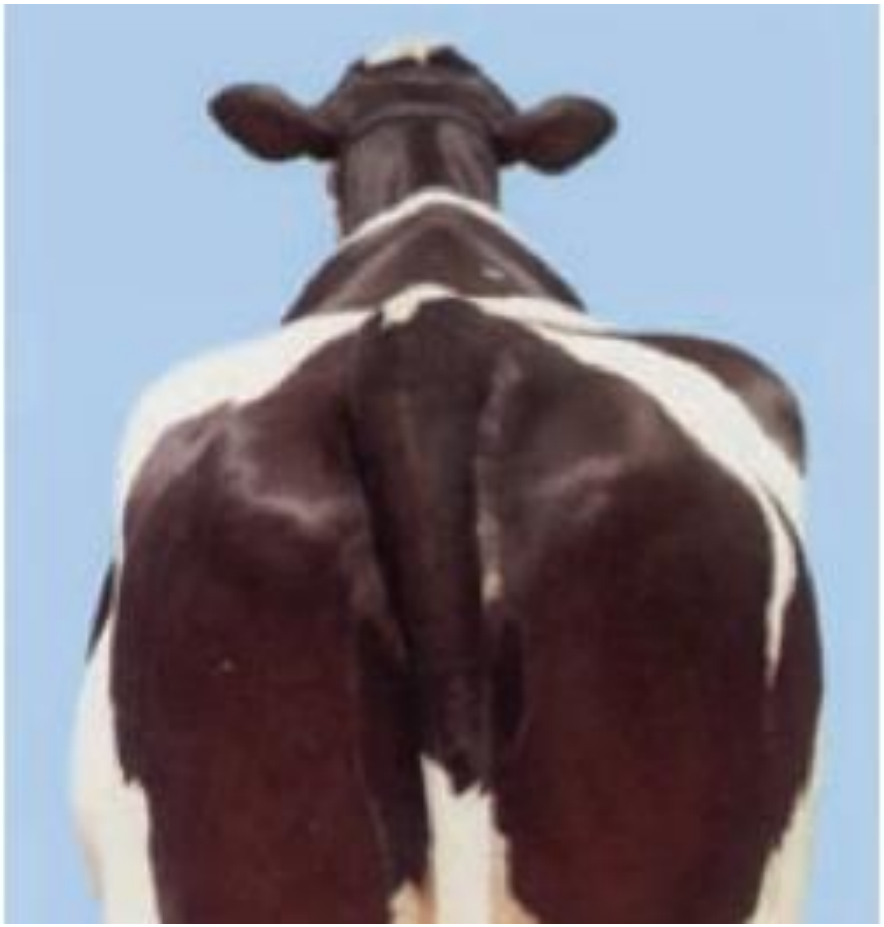


BCS 2

BCS 3

- 3.0 ideal for mid-lactation cows
- 3.25 to 3.75 ideal for late lactation

BCS 4



BCS 5

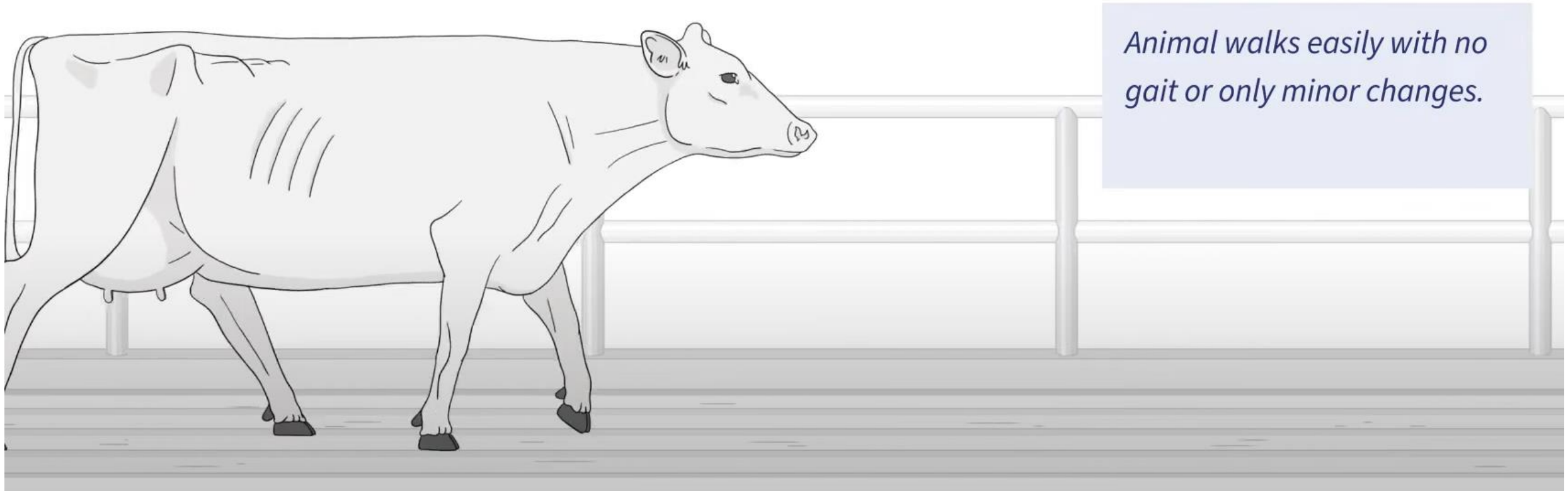
LOCOMOTION SCORING

3-point scoring system

1. Sound with a healthy gait
2. Favors a limb while walking
3. Severely lame, trying to avoid bearing weight on limb

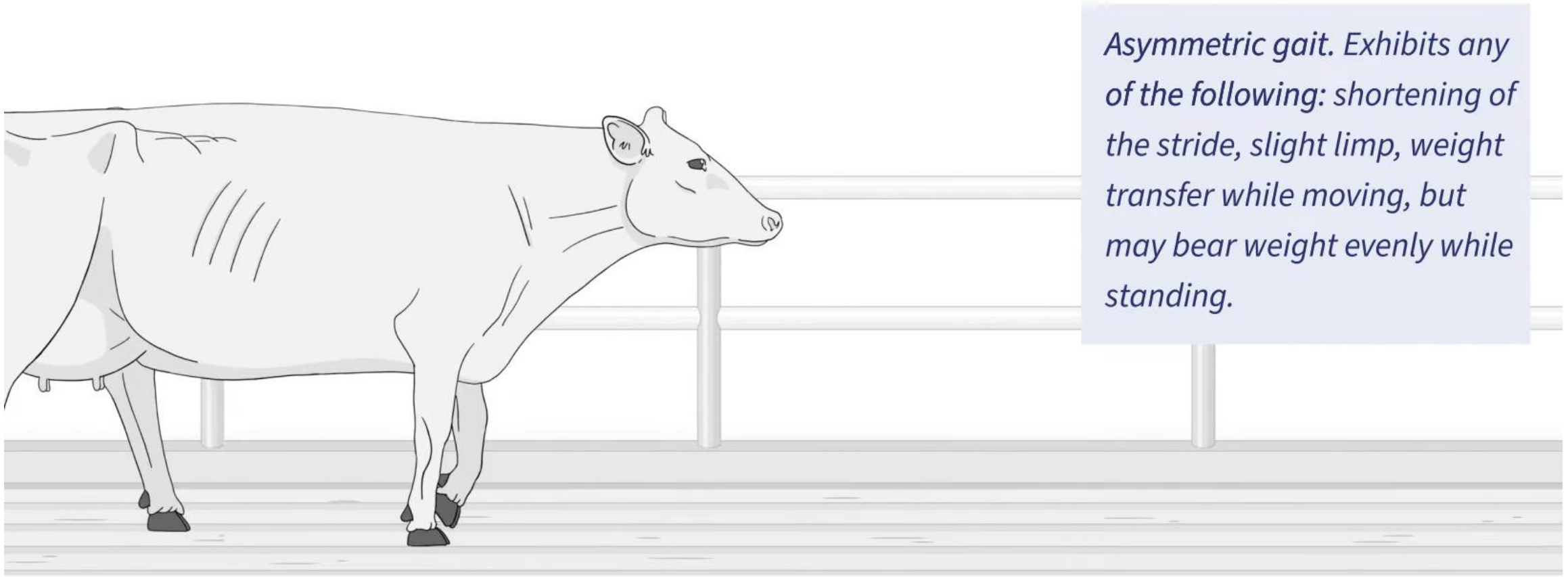
*Follow link to learn more about locomotion scoring: https://www.youtube.com/watch?v=WVqFeLZcZ48

LS 1 - Normal



*For Video representation follow this link: https://www.youtube.com/watch/normallocomotion

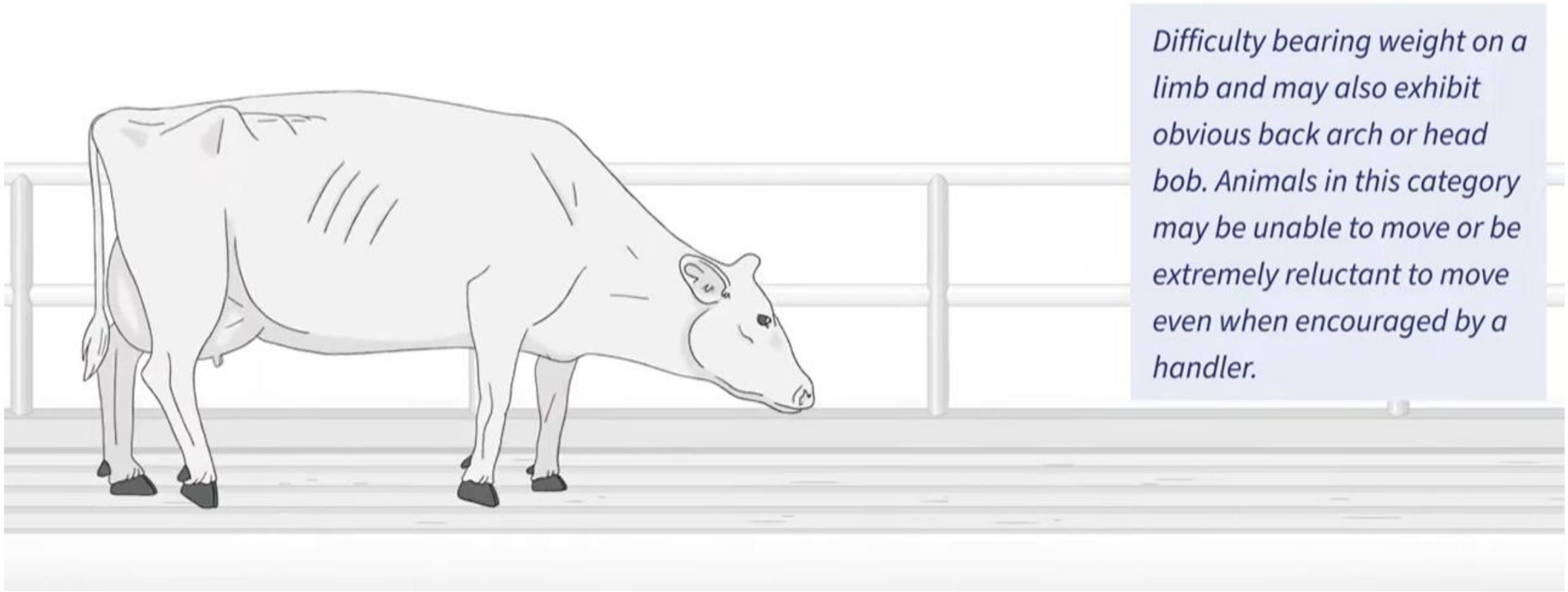
LS 2 - Moderate



Asymmetric gait. Exhibits any of the following: shortening of the stride, slight limp, weight transfer while moving, but may bear weight evenly while standing.

*For Video representation follow this link: https://www.youtube.com/watch/moderatelameness

LS 3 - Severe

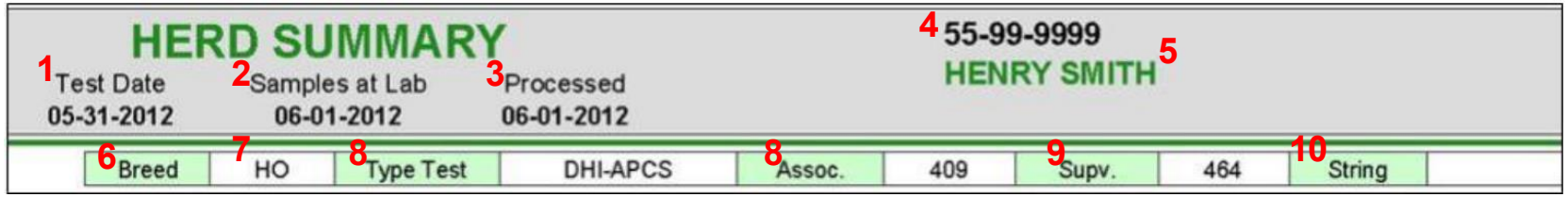


Difficulty bearing weight on a limb and may also exhibit obvious back arch or head bob. Animals in this category may be unable to move or be extremely reluctant to move even when encouraged by a handler.

*For Video representation follow this link: https://www.youtube.com/watch/severelameness

DHIA RECORDS

Heading Information



1. **Test Date**: the month, date, and year the DHI technician finished collecting/verifying data
2. **Samples at Lab**: can be used to determine shipping time
3. **Processed**: the date reports were mailed/uploaded
4. **Herd Code**: unique for each herd; 1st two digits identify state, 3rd and 4th digits identify county, and the 5th – 8th digits identify herd within county
5. **Name**: Owner's name and farm name for the herd
6. **Breed**: two letter code; AY = Ayrshire, BS = Brown Swiss, GU = Guernsey, HO = Holstein, JE = Jersey, MS = Milking Shorthorn, WW = Red and White
   - If there are two or more breeds then the majority (75%) is the code, if no majority then they are mixed = XX
7. **Type test**: used to identify the program they are enrolled
8. **Assoc**: the number of the local DHI association
9. **Supv**: the number of the DHI technician servicing the herd
10. **String**: the string number if herd is divided into permanent strings

Production, Income, and Feed Cost Summary

1. **Total Cows**: all cows (milking/dry) in the herd on test day. Cows sold during current test period are not counted.
2. **Cows in Milk**: includes all cows in milking status on test day
   - Percent: calculated by dividing cows in milk by total cows and multiplying by 100
3. **Milk Lbs. (All Cows)**: average milk production for all cows (milking/dry) in the herd
4. **Fat Lbs. (All Cows)**: average fat production for all cows (milking/dry) in the herd
5. **Fat %**: average fat percent for the herd. Total pounds of fat produced divided by total pounds of milk produced.
6. **Protein Lbs. (All Cows)**: average protein production for all cows (milking/dry) in the herd
7. **Protein %**: average protein percent for the herd. Total pounds of protein produced divided by total pounds of milk produced.
8. **Milk Lbs. (Milking Cows)**: average production for each milking cow on test day

Production, Income & Feed Cost Summary

	2a Daily Average per Cow on Test Day			2b Rolling Yearly Herd Averages		
1 Total Cows	146			140.1		
2 Cows in Milk	Number	%		Number	%	
	140	96		124.7	89	
3 Milk Lbs (All Cows)	69.5			23,037		
4 Fat Lbs (All Cows)	2.65			933		
5 Fat %	3.8			4.1		
6 Protein Lbs (All Cows)	2.13			727		
7 Protein %	3.1			3.2		
8 Milk Lbs (Milking Cows)	72.5					
	Milking Cows	All Cows				
Silage	Lbs Consumed			Lbs Consumed		%ENE
	51	48		16,330		
Other Succulents or Blended Rations	Lbs Consumed			Lbs Consumed		%ENE
Dry Forage	Lbs Consumed			Lbs Consumed		%ENE
	10	9		3,079		
Other Feeds	Lbs Consumed			Lbs Consumed		%ENE
Pasture	NO	NO		Days		%ENE
Concentrates	Lbs Consumed			Lbs Consumed		%ENE
	34	34		12,265		
Value of Product $	11.60	10.89		4,561		
Cost of Concentrates $	4.70	4.61		1,704		
Total Feed Cost $	7.05	6.98		2,526		
Income Over Feed Cost $	4.55	3.91		2,035		
Feed Cost per CWT Milk $	9.72	10.04		10.97		
Milk Blend Price	Per CWT	% Fat	% Pro	Per CWT	% Fat	% Pro
	16.54	4.1	3.1	19.91	4.1	3.2

Production, Income, and Feed Cost Summary Continued

9. **Silage**: average pounds of this forage reported consumed.
10. **Other Succulents or Blended rations**: all other high moisture contents, high fiber feeds or blended rations consisting of all or most of the feeds fed to the herd (haylage, green chop, wet brewers' grain)
11. **Dry Forage**: hay and other high fiber dry forages fed to the herd.
12. **Other Feeds**: all other feeds fed on a group or herd basis. Blended rations may also appear in this category.
13. **Pasture**: indicates whether milking cows have been on pasture this past test period.
14. **Concentrates**: high energy, low fiber feeds fed individually or on a group basis.

Production, Income & Feed Cost Summary

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Total Cows 1	146			140.1		
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	Milking Cows	All Cows				
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	51	48		16,330		
Other Succulents or Blended Rations 10	Lbs Consumed			Lbs Consumed		%ENE
Dry Forage 11	Lbs Consumed			Lbs Consumed		%ENE
	10	9		3,079		
Other Feeds 12	Lbs Consumed			Lbs Consumed		%ENE
Pasture 13	NO	NO		Days		%ENE
Concentrates 14	Lbs Consumed			Lbs Consumed		%ENE
	34	34		12,265		
Value of Product $	11.60	10.89		4,561		
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Production, Income, and Feed Cost Summary Continued

15. **Value of Product $**: a dollar value for the average daily lbs. milk produced. Total daily value for milk produced divided by the number of milking cows.
16. **Cost of Concentrates $**: the average cost per cow based on amounts of concentrate fed and reported cost per ton.
17. **Total Feed Cost $**: the sum of the cost of concentrates plus all other feeds per cow.
18. **Income Over Feed Cost $**: the difference between the Value of Product $ and Total Feed Cost $.
19. **Feed Cost Per CWT Milk $**: the value of all feeds fed to produce 100 pounds (cwt) of milk.
20. **Milk Blend Price**: the reported milk price and fat and protein tests. Generally, represents the price received for milk marketed in the month preceding the test.

Production, Income & Feed Cost Summary

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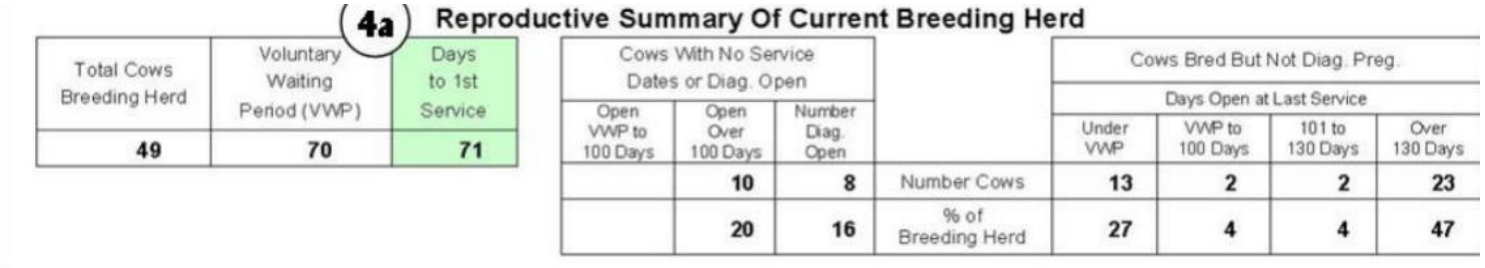
	16.54	4.1	3.1	19.91	4.1	3.2

Reproductive Summary



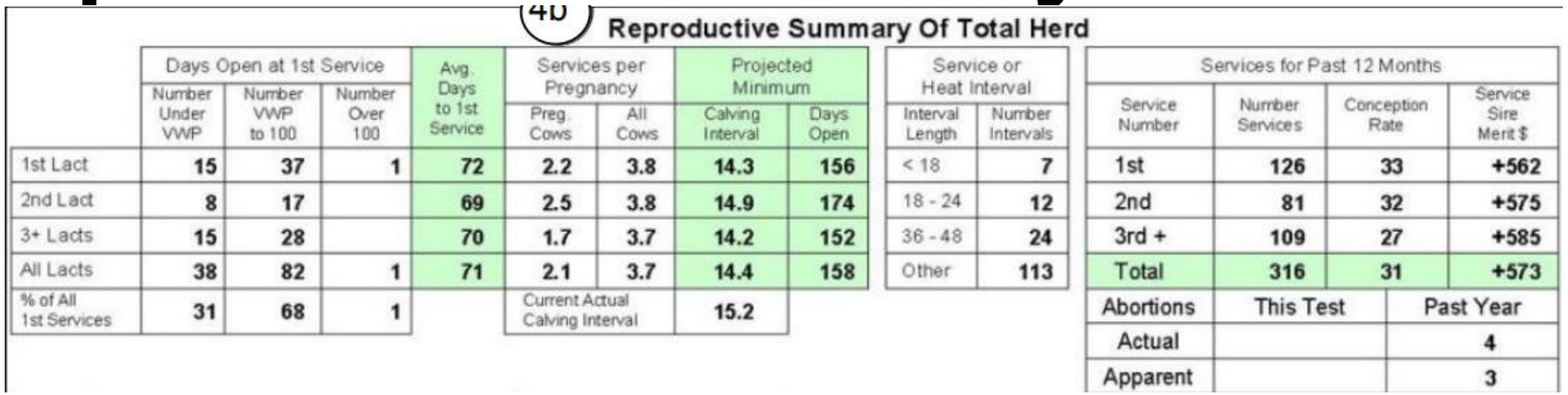
4a Reproductive Summary Of Current Breeding Herd

Total Cows Breeding Herd	Voluntary Waiting Period (VWP)	Days to 1st Service
49	70	71

Cows With No Service Dates or Diag. Open				Cows Bred But Not Diag. Preg.			
				Days Open at Last Service			
Open VWP to 100 Days	Open Over 100 Days	Number Diag. Open		Under VWP	VWP to 100 Days	101 to 130 Days	Over 130 Days
	10	8	Number Cows	13	2	2	23
	20	16	% of Breeding Herd	27	4	4	47

- **Total Cows in Breeding Herd**: cows with no breeding dates open past the VWP.
- **Voluntary Waiting Period (VWP)**: desired waiting period from freshening to first service. Reported in days.
- **Days to 1st Service**: an average of the days to first service of cows in current breeding herd.
- **Cows With No Service Dates or Diag. Open:** cows open from the VWP to 100 days, and cows open over 100 days. The number of cows which have been bred and then diagnosed open at a later time is printed in the area labeled Number Diag. Open.
- **Days Open at Last Service**: either Cows Bred Since mm-dd-yy (65 days before current test day by month, day, year) or Cows Bred But Not Diag. Preg.

Reproductive Summary Continued



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Reproductive Summary Of Total Herd

	Days Open at 1st Service			Avg. Days to 1st Service	Services per Pregnancy		Projected Minimum	
	Number Under VWP	Number VWP to 100	Number Over 100		Preg. Cows	All Cows	Calving Interval	Days Open
1st Lact	15	37	1	72	2.2	3.8	14.3	156
2nd Lact	8	17		69	2.5	3.8	14.9	174
3+ Lacts	15	28		70	1.7	3.7	14.2	152
All Lacts	38	82	1	71	2.1	3.7	14.4	158
% of All 1st Services	31	68	1		Current Actual Calving Interval		15.2	

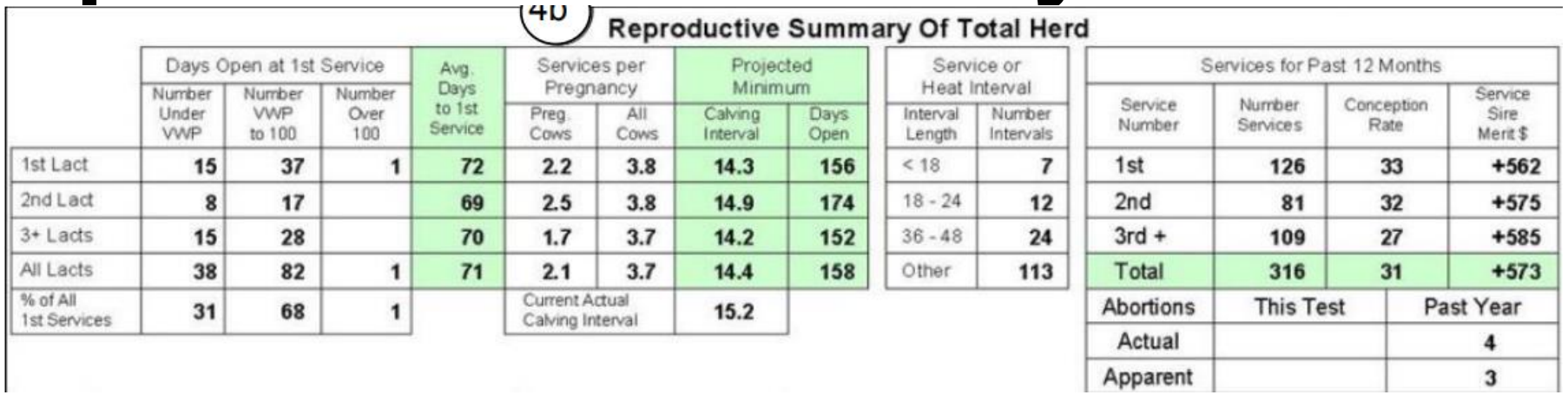
Service or Heat Interval	
Interval Length	Number Intervals
< 18	7
18 - 24	12
36 - 48	24
Other	113

Services for Past 12 Months			
Service Number	Number Services	Conception Rate	Service Sire Merit $
1st	126	33	+562
2nd	81	32	+575
3rd +	109	27	+585
Total	316	31	+573

Abortions	This Test	Past Year
Actual		4
Apparent		3

- **Days Open at 1st Service:** divides all cows in the herd that have been bred at least once into three categories; Number under VWP, Number VWP to 100 days, and Number over 100 days
- **Avg. Days to 1st Service**: calculated by summing the days to first service for all cows in each category which have been bred at least once.
- **Services per Pregnancy – Preg. Cows**: includes all pregnant cows
- **Services per Pregnancy – All Cows**: includes all services more than 64 days before test day plus services for cows bred in the last 64 days which have been diagnosed pregnant or open
- **Projected Minimum Calving Interval:** calculated as {(Avg. Days Open + 280 days)/30.4}, days where 280 days is the average length of gestation and 30.4 is the average length of a month

Reproductive Summary Continued



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Abortions	This Test	Past Year
Actual		4
Apparent		3

- **Projected Minimum Days Open**: average days open based on days open calculations
- **Service or Heat Interval**: a summary of all service or heat intervals for cows currently in the herd.
- **Services for Past 12 Months**: a summary by 1st service, 2nd service, 3rd and later service and all services
- **Number of Services**: determined by adding all monthly services shown in the Yearly Reproductive Summary of the DHI-202 for months with % successful printed (usually all but last 2 test dates).
- **Conception Rate**: the number of successful services in each category divided by total service *100
- **Service Sire Merit $**: the average Merit $ for all services to proven sires.

Yearly Reproductive Summary

- **Test Dropped**: labeled on the top line of this summary is normally one test day
- **% of Heats Observed**: an indication of the success of heat detection in the herd.
- **Conception Rate**: the number of successful services in each test period divided by the total number of services for that test period
- **Preg Rate**: the percentage of cows eligible to become pregnant that are reported pregnant in a specific period of time.
- **Number Confirmed Preg:** represents the outcome of pregnancy exams conducted during that test period
- **Number Calving**: reported number of calvings during test period
- **Total Preg Cows**: total number of preg cows on test day

4c Yearly Reproductive Summary

Test Date	% Heats Obs.	Conception Rate	Preg Rate	Number Services	Number Confirm Preg	Number Calving	Total Preg Cows
Test Dropped	32	27	9	15	14	7	72
6-30-11	77	25	12	28		8	66
8-02-11	17	14	2	7	12	15	66
8-31-11	55	18	5	17		20	52
9-29-11	55	13	9	30	9	20	46
10-31-11	58	29	12	31		18	37
11-29-11	59	37	22	46	7	20	29
12-29-11	26	35	15	26		10	24
1-31-12	64	39	18	44	18	9	33
2-29-12	57	35	19	34	17	7	47
3-26-12	43	40	11	15		8	42
4-30-12	58			30	29	10	68
5-31-12	3			12	7	10	72
Averages	48	29	13	27	8	13	49
Totals				320		155	

Birth Summary

- Summarizes the number, sex, and mortality of calves born in the last year by first lactation and second and later lactations.
- The calving difficulty score, if reported, is also summarized for each group on a scale from 1 to 5:
  - 1=No problems,
  - 2=Slight problem,
  - 3=Needed assistance,
  - 4=Considerable force used
  - 5=Extreme difficulty.
- The percent of births with a difficulty score of 4 and 5 is also listed. Calving ease information may be used to evaluate the effectiveness of selecting the best calving ease sires for heifers and smaller cows.

5 **Birth Summary**

Dam's Lact Num	Offspring Born								
	Males		Females		Calving Difficulty Score				
	Alive	Dead	Alive	Dead	1	2	3	4 & 5	% 4+5
1	31	5	25	5	39	2	23	2	3
2+	44	10	39	4	68	1	18		
Total	75	15	64	9	107	3	41	2	1

Stage of Lactation Profile

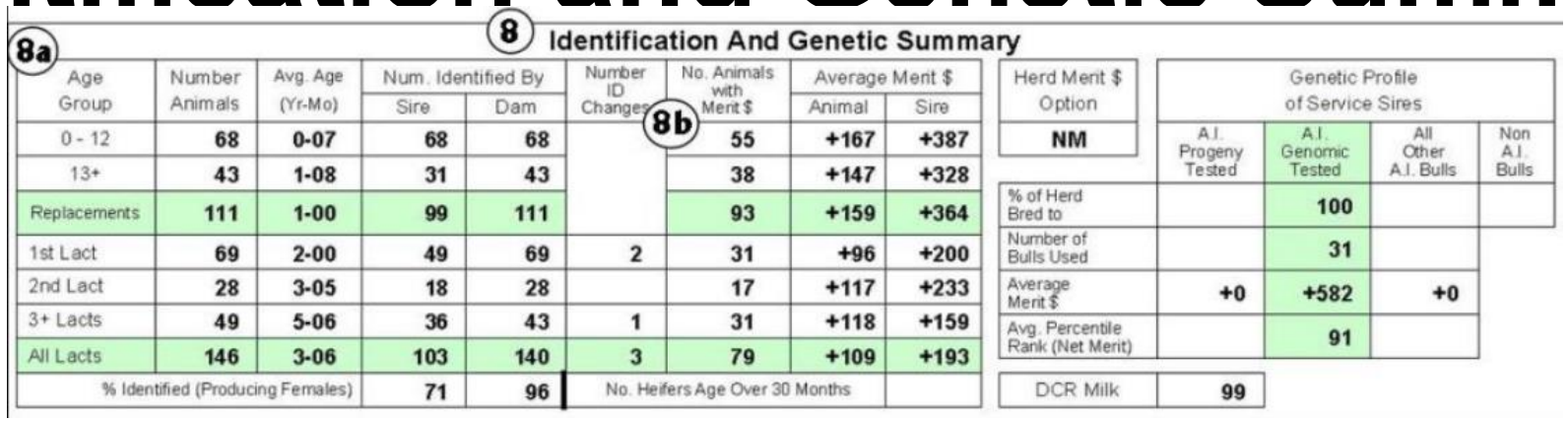
- Divides the milking herd into five groups based on days in milk for the current lactation: 40 days or less, 41 to 100 days, 101 to 199 days, 200 to 305 days, and 306 days and greater
- First, second, and third and later lactation cows are summarized separately within each stage of lactation group
- **% Fat & Prot**: listed together to allow comparisons between the two components.
- **SCC SCR or SCC ACT**: can help you monitor somatic cell count across stage of lactation.

Stage Of Lactation Profile (7)

			Stage of Lactation (Days)					
			1 - 40	41 - 100	101 - 199	200 - 305	306 +	Total or Average
Number Milking	1st Lact		8	11	11	23	15	68
	2nd Lact			2	7	10	6	25
	3+ Lacts		1	6	8	23	6	44
	All Lacts		9	19	26	56	27	137
Average Daily Milk	1st Lact		56	76	75	69	55	66
	2nd Lact			96	87	71	51	73
	3+ Lacts		107	99	92	77	66	82
	All Lacts		62	85	83	73	57	73
% Fat & Pro	1st Lact	% Fat	3.7	3.6	4.1	3.9	4.1	3.9
		% Pro	3.0	2.8	3.0	3.2	3.3	3.1
	2nd Lact	% Fat		3.9	3.8	4.0	4.1	4.0
		% Pro		2.7	3.0	3.3	3.6	3.2
	3+ Lacts	% Fat	3.7	3.4	3.5	3.8	4.3	3.8
		% Pro	3.0	2.7	2.9	3.1	3.5	3.1
	All Lacts	% Fat	3.7	3.6	3.8	3.9	4.1	3.9
		% Pro	3.0	2.8	3.0	3.2	3.4	3.1
SCC ACT	1st Lact		163	41	83	88	301	125
	2nd Lact			14	273	41	122	130
	3+ Lacts		214	384	118	173	433	226
	All Lacts		173	163	148	117	299	163
SCC ACT >= 200	Number		3	1	4	7	8	23
	Percent		33	5	15	13	30	16

Weighted SCC ACT (Nearest 1,000)

Identification and Genetic Summary



8 Identification And Genetic Summary

8a

Age Group	Number Animals	Avg. Age (Yr-Mo)	Num. Identified By Sire	Num. Identified By Dam	Number ID Changes	No. Animals with Merit $	Average Merit $ Animal	Average Merit $ Sire
0 - 12	68	0-07	68	68		55	+167	+387
13+	43	1-08	31	43		38	+147	+328
Replacements	111	1-00	99	111		93	+159	+364
1st Lact	69	2-00	49	69	2	31	+96	+200
2nd Lact	28	3-05	18	28		17	+117	+233
3+ Lacts	49	5-06	36	43	1	31	+118	+159
All Lacts	146	3-06	103	140	3	79	+109	+193
% Identified (Producing Females)			71	96	No. Heifers Age Over 30 Months			

8b

Herd Merit $ Option
NM

DCR Milk	99

Genetic Profile of Service Sires

	A.I. Progeny Tested	A.I. Genomic Tested	All Other A.I. Bulls	Non A.I. Bulls
% of Herd Bred to		100		
Number of Bulls Used		31		
Average Merit $	+0	+582	+0	
Avg. Percentile Rank (Net Merit)		91		

- **Age Group**: two categories for replacements plus a total number line
- **Average Age Yr-Mo** indicates the average age in years and months for each age group category for replacements and is the average age at last freshening for cows.
- **Number Identified by Sire / Dam**: indicates the number of replacement and producing females with identified sires and dams
- **Number ID Changes**: a tabulation of all identification changes which were reported after the second test date following a cow's entry into the herd
- **Herd Merit $ Option** indicates whether a herd chooses bulls based on MFP (milk, fat and protein), MF (milk and fat) or CY (cheese yield).

Production by Lactation Summary

⑨ **Production By Lactation Summary**

Number of Cows	Avg. Age (Mo)	Peak Milk	Summit Milk	Proj 305 Day ME			Difference From Herdmates			Avg. Body Wt.
				Milk	Fat	Pro	Milk	Fat	Pro	
69	24	78	69	24850	984	752	+1414	+54	+38	1210
28	41	94	89	25462	1030	783	+1188	+65	+42	1470
49	66	103	96	25555	979	778	+1482	+23	+43	1500
146	42	90	83	25221	992	768	+1390	+45	+41	1360

- **Number of Cows**: total cows for each lactation in the herd on test day.
- **Avg. Age (Mo)**: gives age in months for each lactation group and all lactations.
- **Peak Milk**: a cow's highest daily milk production within a lactation for a test day prior to 150 days in milk.
- **Summit Milk**: average of the two highest of the first three test days production and is listed for animals by lactation number and for all animals
- **Proj ME 305 Day ME Milk, Fat, Protein** for all cows with projected 305 day mature equivalent (ME) records printed on the DHI-200, 210, 211, 220 and 225 (Monthly Report) are added and averaged.
- **Difference from Herdmates Milk, Fat and Protein** for all cows with a value printed on the DHI-200 and 220 are added and averaged.

Somatic Cell Summary

- Provides a herd analysis for milk quality and mastitis
- **% Cows SCC Score**: the % of first, second, and third and greater lactation cows, and all cows in each of five somatic cell count score categories (0-3, 4, 5, 6, 7-9) are listed.
- **Herd Production Lost From SCC This Test Period**: the expected loss of milk and income due to the somatic cell count for the entire herd.

(10) Somatic Cell Summary

	% Cows SCC Score				
	0,1,2,3	4	5	6	7,8,9
	Below 142,000	142,000 283,000	284,000 565,000	566,000 1.13 M	Over 1.13 M
1st Lact	**82**	**6**	**6**	**4**	**1**
2nd Lact	**88**		**4**	**4**	**4**
3+ Lacts	**70**	**11**	**5**	**9**	**5**
All Lacts	**80**	**7**	**5**	**6**	**3**

Herd Production Lost From SCC This Test Period

Milk	**651**	Dollars ($)	**108**

Yearly Production and Health Summary

- **Test Period Persistency Index** provides a means to determine if the herd produced as expected during the current month based on the previous month's production
- **Test Day Averages (All Cows)** report average Milk production, % Fat and % Protein for all cows in the herd, including dry cows
- **Rolling Yearly Herd Average** for milk, fat and protein for each test period in the past year are listed.

(13) Yearly Production And Mastitis Summary

Test Date	Test Period Persist. Index	Test Day Averages (All Cows)				Rolling Yearly Herd Average			Somatic Cell Count Summary							MUN	Number Left Herd	
									% Cows SCC Score					Avg. SCC Linear Score	Wt. Avg. Actual SCC			
		% In Milk	Milk	%Fat	%Pro	Milk	Fat	Pro	0,1,2,3 Below 142,000	4 142,000 283,000	5 284,000 565,000	6 566,000 1.13 M	7,8,9 Over 1.13 M				Died	Sold
Test Dropped	103	85	62.2	3.9	3.1	22664	917	720	66	11	11	7	6	2.9	311		1	
6-30-11	95	82	55.7	4.0	3.1	22484	912	717	59	14	12	8	7	3.0	343			
8-02-11	92	80	46.4	3.8	3.0	22132	902	706	63	9	14	7	8	2.9	366		1	3
8-31-11	104	81	48.6	3.9	3.0	21830	891	697	57	16	14	4	9	3.2	431		3	
9-29-11	113	85	57.8	4.0	3.2	21615	883	689	69	7	10	7	7	2.6	271		1	7
10-31-11	104	87	60.8	4.3	3.2	21653	882	689	68	12	6	7	6	2.6	278		1	2
11-29-11	99	91	64.2	4.1	3.3	21927	890	697	70	12	5	8	5	2.5	282			6
12-29-11	107	93	69.2	4.3	3.2	22089	898	700	72	14	5	4	4	2.4	209		1	7
1-31-12	100	94	70.8	3.9	3.2	22161	902	701	78	5	7	5	5	2.2	250			4
2-29-12	107	95	74.5	4.3	3.2	22323	907	706	78	9	4	6	3	2.1	180			12
3-26-12	101	96	76.1	4.0	3.2	22556	917	714	80	5	7	2	6	2.1	199			
4-30-12	97	96	70.1	4.1	3.1	22842	928	722	77	10	8	2	3	2.0	129			5
5-31-12	107	96	69.5	3.8	3.1	23037	933	727	80	7	5	6	3	2.1	163			1
Averages	102	90	63.6	4.0	3.1				71	10	8	6	6	2.5	258		7	47

Test Period Avg. Milk Lbs | Added 69.2 | Dropped 63.2

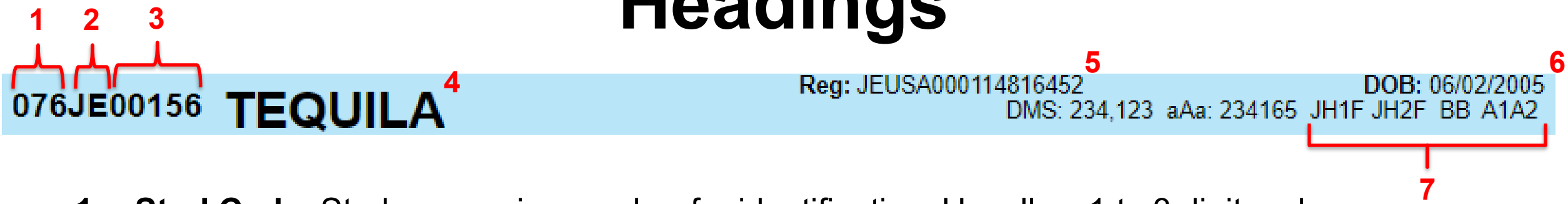
- **Somatic Cell Count Summary** includes the % of cows in each of the five SCCS categories
- **Number Left Herd** includes the number of cows Died or Sold during each test period.
- **Test Period Average Milk Lbs Added** and **Dropped** should be used to evaluate changes in the Rolling Herd Average for milk.

More Information

- For more information on DHIA and herd summaries visit this link: https://www.dairychallenge.org/pdfs/student_resources/Explanation-202-Herd-Summary.pdf

SIRE SUMMARIES

Headings



1. **Stud Code**: Stud companies number for identification. Usually a 1 to 3 digit code
2. **Breed**: breed of the sire; AY = Ayrshire, BS = Brown Swiss, GU = Guernsey, HO = Holstein, JE = Jersey, MS = Milking Shorthorn
3. **Sire Code**: sire's unique number associated within the stud company.
4. **Name**: short name of the sire that is often recognizable.
5. **Registration Number**: The bull's registration number officially identifies him and is assigned by the breed organization.
6. **Date of Birth**: month/day/year the sire was born (MM/DD/YYYY).
7. **Genetic Codes**: These codes indicate the results of any genetic tests that have been done on the bull, so breeders can see if there are any traits or conditions they should be aware of.

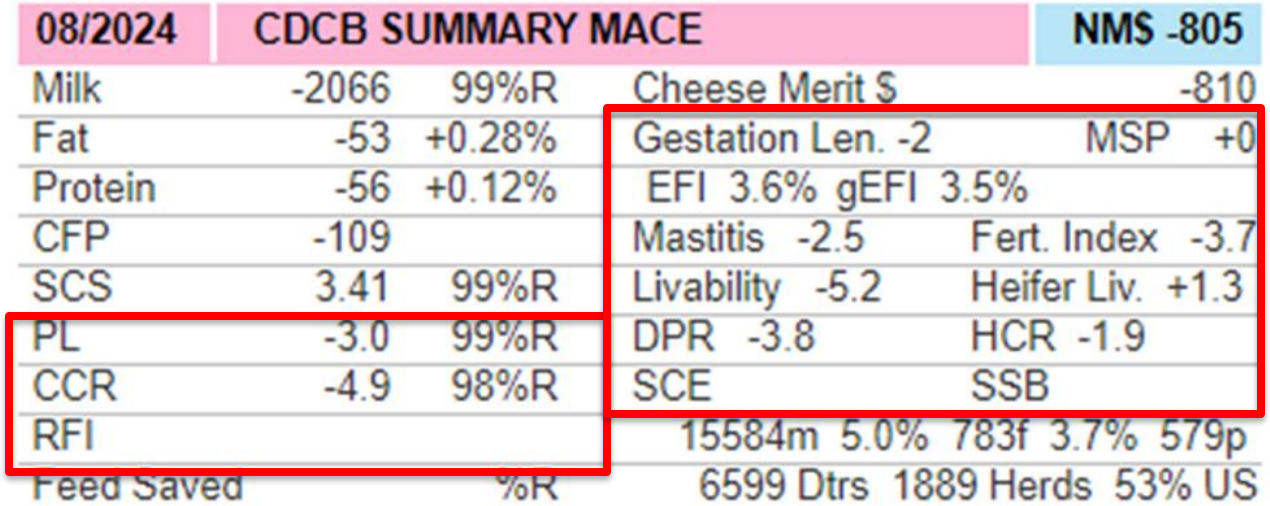
Production Traits

08/2024	CDCB SUMMARY MACE			NM$ -805
Milk	-2066	99%R	Cheese Merit $	-810
Fat	-53	+0.28%	Gestation Len. -2	MSP +0
Protein	-56	+0.12%	EFI 3.6% gEFI 3.5%	
CFP	-109		Mastitis -2.5	Fert. Index -3.7
SCS	3.41	99%R	Livability -5.2	Heifer Liv. +1.3
PL	-3.0	99%R	DPR -3.8	HCR -1.9
CCR	-4.9	98%R	SCE	SSB
RFI			15584m 5.0%	783f 3.7% 579p
Feed Saved		%R	6599 Dtrs	1889 Herds 53% US

- Information in this section gives you an estimate of a bull's ability to transmit production traits, such as pounds of milk, pounds and percentages of components.

- **%R** describes the reliability of these values transmitting into offspring.
  - Bulls with a higher number of daughters tend to have higher %R dues to more "proof"
- **TPI (total performance index), NM$ (net merit), Cheese Merit $**, are all calculated indexes to describe production, or components.

Health Traits



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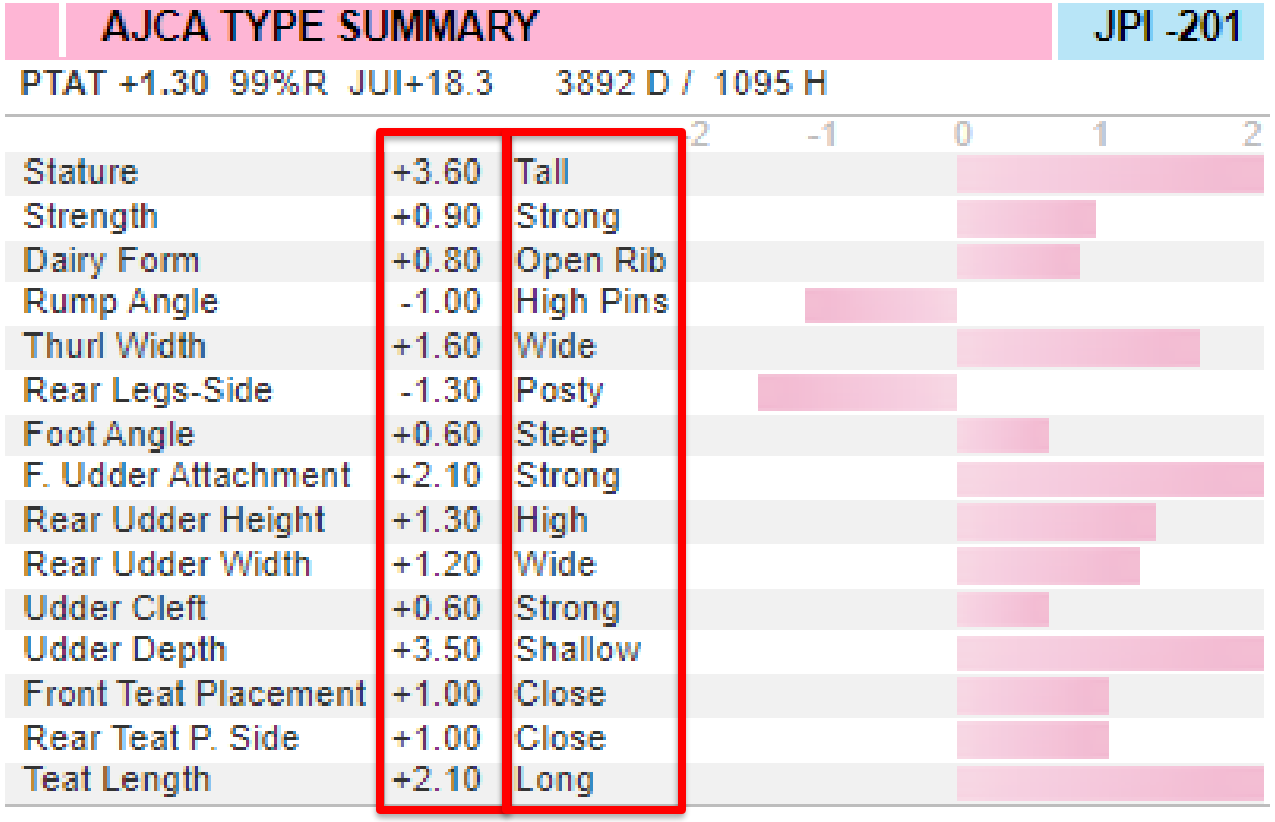
SCS	3.41	99%R	Livability -5.2	Heifer Liv. +1.3
PL	-3.0	99%R	DPR -3.8	HCR -1.9
CCR	-4.9	98%R	SCE	SSB
RFI			15584m 5.0%	783f 3.7% 579p
Feed Saved		%R	6599 Dtrs 1889 Herds	53% US

- **PL (Productive Life)**: gives a measure of the amount of time a cow stays in the herd as a "productive" animal, and represents how many months of additional (or fewer, if a negative number) lifetime you can expect from a bull's daughters

- **SCE (Sire Calving Ease)**: measures the tendency of calves from a particular sire to be born more or less easily
- **CCR (Cow Conception Rate)**: ability to conceive as a lactating cow
- **HCR (Heifer Conception Rate)**: ability to conceive as a maiden heifer
- **DPR (Daughter Pregnancy Rate)**: a cow's overall ability to start cycling again, show heat, conceive, and maintain a pregnancy
- **EFI (Expected Fertility Index)**: combines several reproductive components into one overall index: 18% HCR + 18% CCR + 64% DPR

Type Traits

- Detailed breakdowns of body, udder, feet & leg traits.
- Changes based on scored/classified daughters
- **Standard Transmitting Abilities (STAs)**: An STA is a bull's PTA value for a trait listed on a standardized scale, allowing the traits to be easily viewed with and compared to other traits.
  - STAs usually fall within three units plus or minus of zero.
- **Biological Extremes**: When a bull's STA value is above 0.85 or less than -0.85, the descriptor is highlighted, showing that the bull's STA is in the top 20 percent of the available bull population.



- The traits that describe the phenotype of the bull's daughters.

Pedigree Information

Tower Vue Prime Tequila ET

Primetime x Sambo x Regal

Sire:	Gil-Bar Sparkler Primetime
Dam:	Pleasant Nook Sambo Teal EX-94% 5-00 305d 19040m 5.2 990f 3.5 662p
MGS:	Lester Sambo
MGD:	Pleasant Nook Regal Teal
MGGS:	Hollylane R Regal-ET
MGGD:	Pleasant Nook J Imp Toots

- Reports the lineage of the bull including sire, dam, maternal grandsire (MGS), maternal granddam (MGD), maternal great grandsire (MGGS) and granddam (MGGD)
- Can find the bull's full name and dam's score here.
- Will also find a picture of the bull

Other Sire Indexes

- **Breed & Custom Indexes**: Jersey Udder Index (**JUI**), Jersey Performance Index, (**JPI**), Genomic Total Performance Index (**GTPI**), etc.
- CDCB Merit Rankings: place emphasis on research-based data
  - **Net Merit Dollars (NM$)**: designed to reflect economics of the dairy industry; 52% production and efficiency, 35% health and fertility, and 13% type traits
  - Cheese Merit Dollars (CM$): heavier weighting on milk components and less on milk
  - **Fluid Merit Dollars (FM$)**: reflects pricing in federal orders in Southeast US (TN), where it is weighted more heavily for fluid milk production
  - **Grazing Merits Dollars (GM$)**: reflects increased need for good mobility and cow fertility in grazing herds

More Information

- For more information on indexes follow this link:
  - https://us.altagenetics.com/knowledge/proof-terminology-explained
  - https://dairy.extension.wisc.edu/articles/its-proof-time-how-you-can-decode-dairy-sire-summaries/

- For more Holstein specific info follow this link:
  - https://www.holsteinfoundation.org/pdf_doc/workbooks/Gen_Sire_WKBK.pdf

IDENTIFYING FEEDS AND FORAGES

CONCENTRATES

Shelled/Whole Corn

- Energy
- Can be broken down into other forms of corn
- Not often used in this form to formulate rations

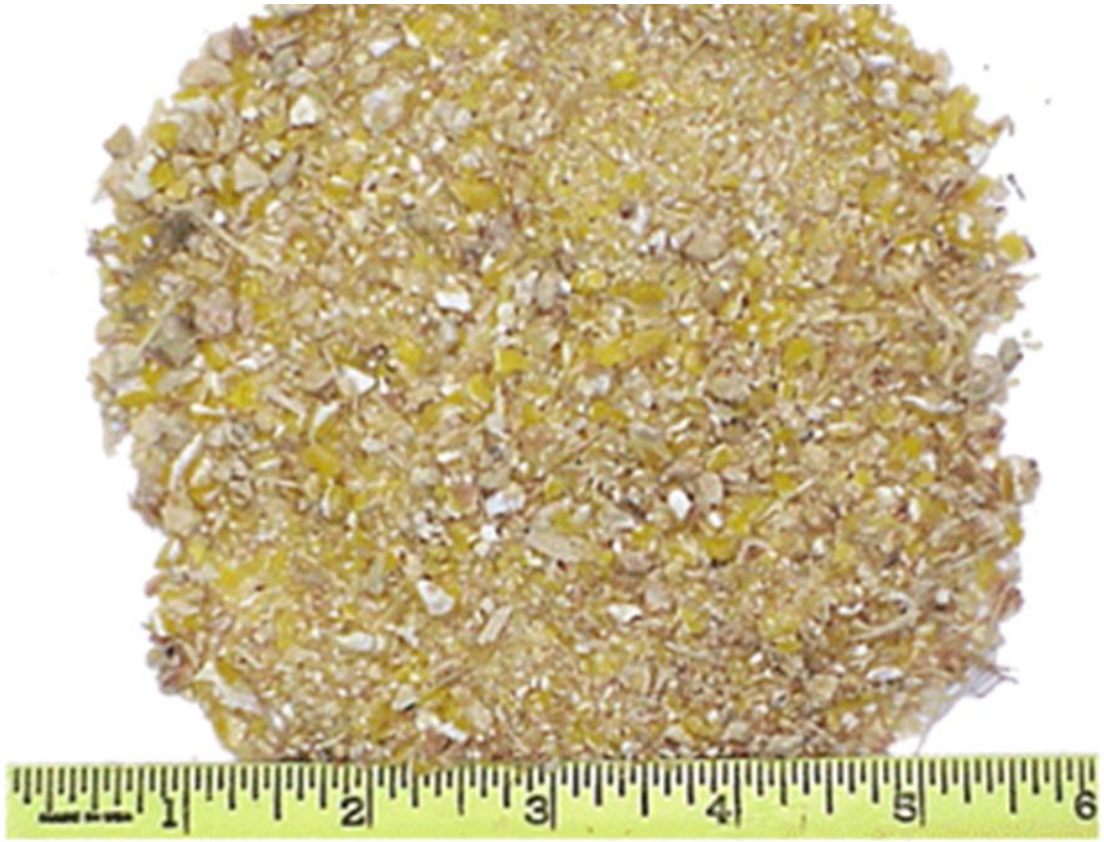
Ground Shelled Corn

- Energy
- Commonly used in dairy cattle rations.

Cracked Shelled Corn

- Energy

Ground Ear Corn



- Energy

Corn Gluten Feed/Meal

- Protein

Whole Oats

- Energy

Crimped Oats

- Energy
- More digestible than whole oats

Steam Rolled Oats

- Energy
- Highly digestible

Whole Barley

- Energy

Steam Rolled Barley

- Energy
- More digestible than whole barley

Whole Wheat

- Energy

Wheat Bran

- Fiber

Milo (Sorghum)

- Energy

Whole Soybeans

- Protein

Soybean Meal

- Protein
- Highly used in dairy rations
- More digestible than whole soybeans

Soybean Hulls (Pellets)

- Protein

Whole Cottonseed

- Protein

Cottonseed Meal

- Protein

Cotton Seed Hulls

- Fiber

Dried Distiller's Grains

- Protein

Blood Meal

- Protein
- Poorly palatable

Bone Meal

- Protein
- Poorly palatable

Dried Molasses

- Buffer
- Assists in palatability (taste)

Beet Pulp

- Fiber

Urea

- Urea

Ground Limestone

- Mineral

Dicalcium Phosphate (Dical)

- Mineral

Salt (Sodium Chloride)

- Mineral

Trace-Mineralized Salt

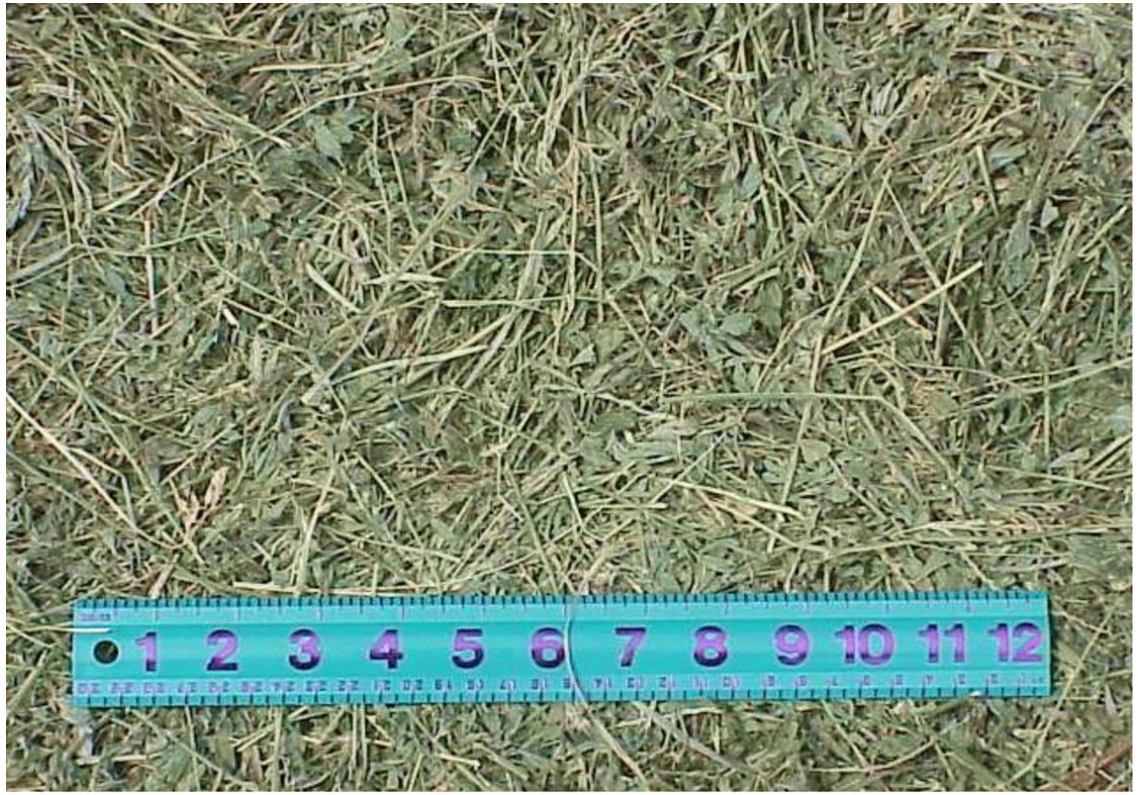
- Mineral

By-Product Feeds

- Almond Hulls
- Cottonseed hulls
- Rice hulls
- Whey
- Soyhulls
- Oat hulls
- Peanut hulls
- Peanut skins
- Corncobs
- Beet/citrus pulp
- Wheat middlings
- Wheat bran
- Blood meal
- Fish meal
- Bone meal
- Soybean meal
- Cottonseed meal
- Distiller's/Brewer's grains

FORAGES/ROUGHAGES

Alfalfa Hay



- Legume
- High Protein

Fescue Hay

- Fescue Toxicosis

Orchardgrass Hay

Timothy Hay

Red Clover Hay

White Clover Hay

Corn Silage

- Ensiled forage source
- High in energy
- Most common forage source for lactating cows and TMR

Baleage/Haylage

- Ensiled forage source
- Any hay type may be used
- Preserves nutrient value of the forage
- Done by wrapping the hay and cutting off oxygen

NUTRITION

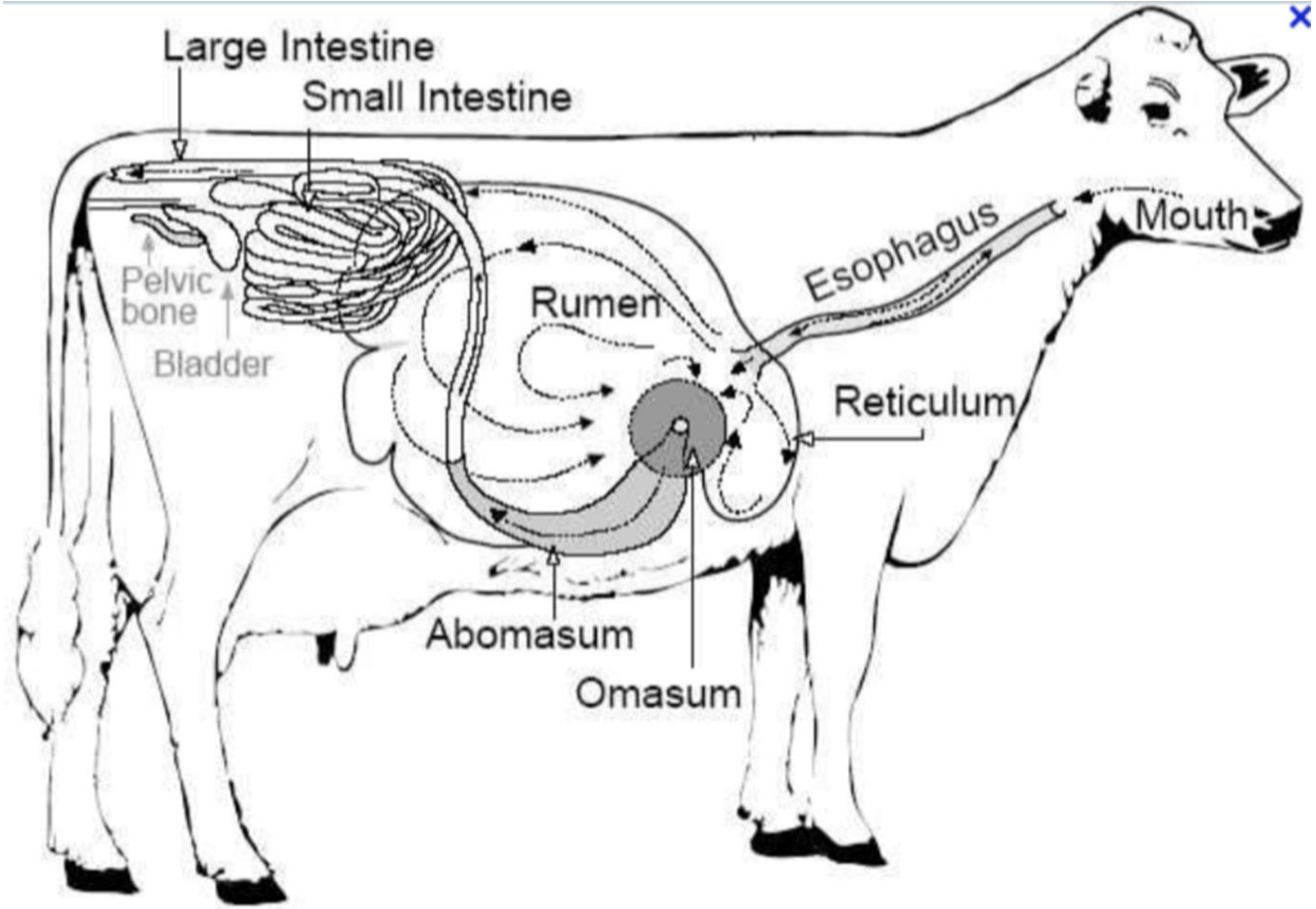
Factors that affect nutrient requirements

- Body weight
- Fat test
- Body condition
- Age
- Stage of lactation
- Environmental temperature
- Milk production level
- Reproductive status

Amino Acids

- Building blocks of true proteins
  - Arginine
  - Histidine
  - Isoleucine
  - Leucine
  - **Lysine (most limiting in dairy cattle nutrition)**
  - **Methionine (most limiting in dairy cattle nutrition)**
  - Phenylalanine
  - Threonine
  - Tryptophan
  - Valine

Nutritional Anatomy

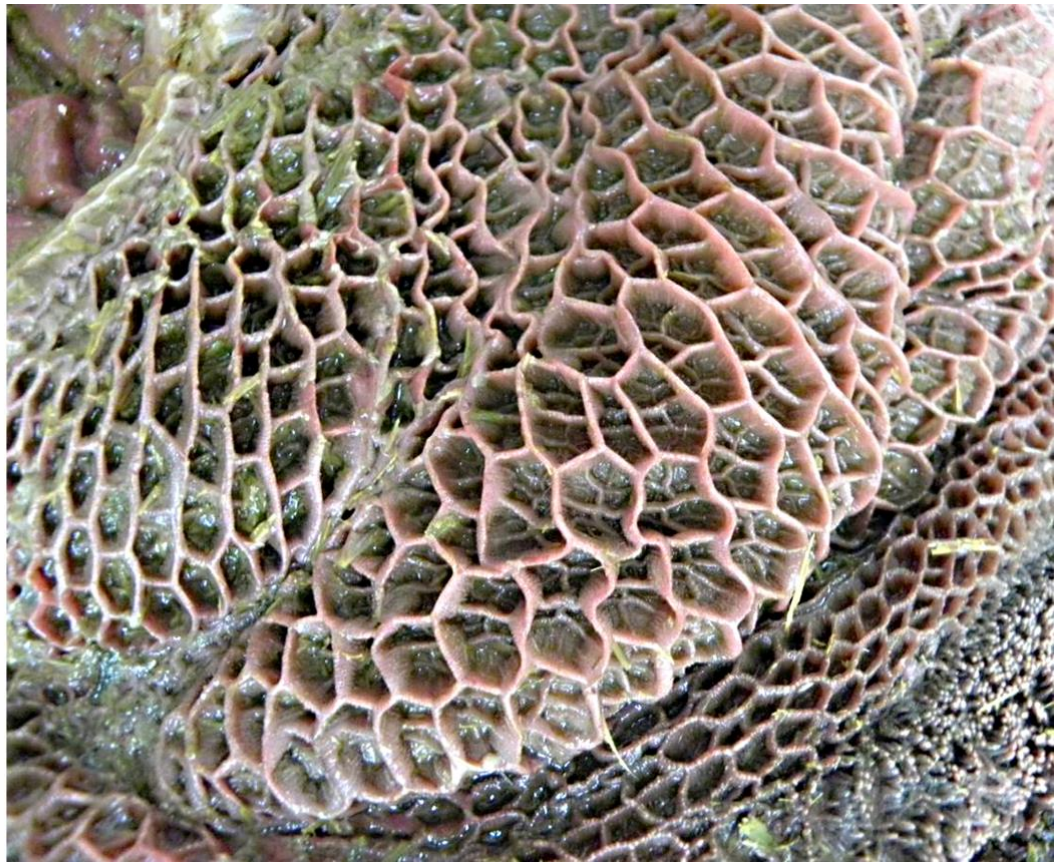


*Be familiar with parts of a ruminant digestive system and flow of feed through system

Rumen

- Largest Compartment
- Finger-like projections (papillae)

Reticulum

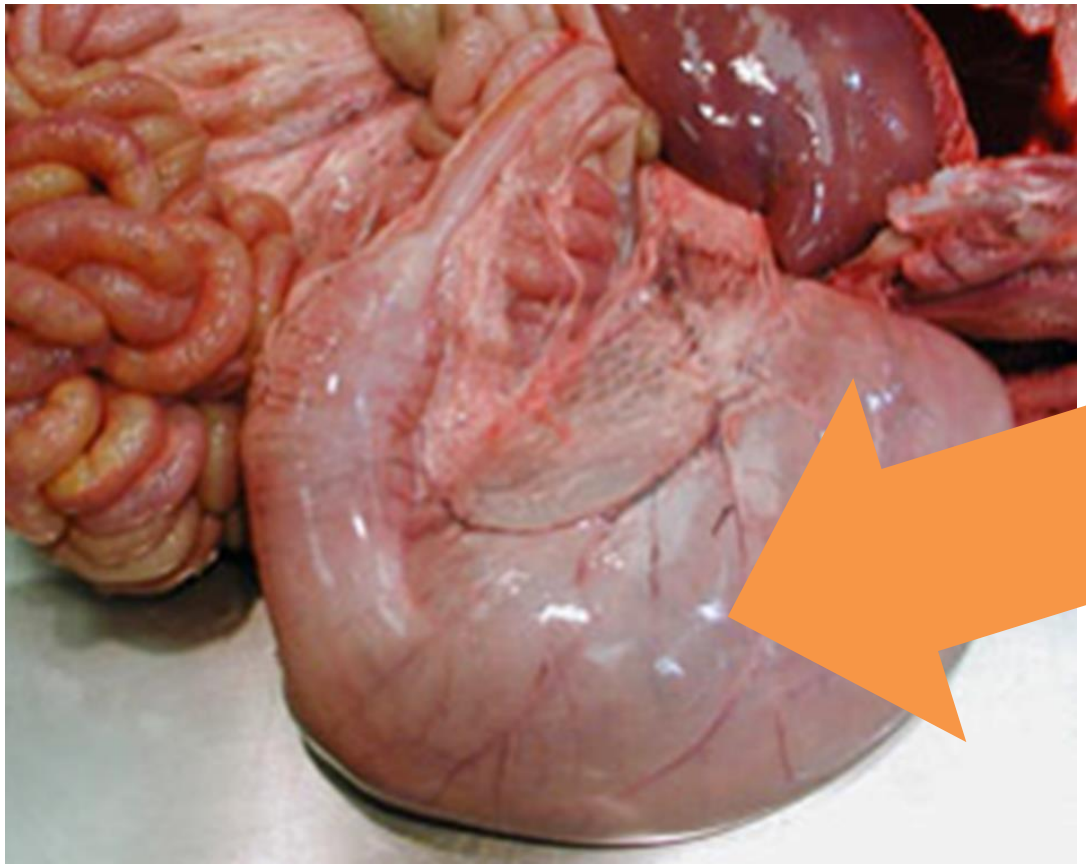


- Honey Comb structures
- Common place for hardware disease

Omasum

- Paper-like structures
- Water absorption

Abomasum



- “True” stomach
- Nutrient absorption

TMR (Total Mixed Ration)

- Most forage particles in silage and haylage should range from 3/8 to 3/4 in length
- Forage particles that are very fine or grain that is too whole or coarse should be avoided
- Cows sort against long particles and sort for finer particles
- Good mixture of particle length – difficult to pick out individual feed types which limits sorting
- Very long particle size – can lead to sorting and inefficient feed intake

Advantages of Feeding TMR

- Eliminate selective feeding
- Lower percent of fiber needed in ration
- Consistent ration
- Easier to balance precisely
- High dry matter intake
- Fewer digestive upsets
- Free choice mineral not needed
- Can feed a variety of by-product
- Higher milk production

Penn State Shaker Box

Recommended distribution of particle size (percent remaining on each screen) for corn silage, haylage, and TMR samples

Screen	Pore Size (inches)	Particle Size (inches)	Corn Silage	Haylage	TMR
Upper Sieve (19 mm)	0.75	> 0.75	3 to 8%	10 to 20%	2 to 8%
Middle Sieve (8 mm)	0.31	0.31 to 0.75	45 to 65%	45 to 75%	30 to 50%
Lower Sieve (4 mm)	0.16	0.16 to 0.31	20 to 30%	30 to 40%	10 to 20%
Bottom Pan		< 0.16	< 10%	< 10%	30 to 40%

https://extension.psu.edu/downloadable/download/sample/sample_id/963/

Shaker Box Continued

Table 2. Miner Institute's PSPS recommendations*

	Sieve (mm)	% retained	Comments
Top	19	less than 5	Sortable material, too long, increases time needed for eating; especially if greater than 10 percent.
Mid 1	8	greater than 50	Still long and physically effective, more so than 4-mm material. Maximize amount on this sieve 50 to 60 percent.
Mid 2	4	10 to 20	Functions as physical effectiveness factor (pef) sieve, no recommendation for amount to retain here other than total on the top three sieves equal pef.
Pan	--	25 to 30	A 40 to 50 percent grain diet results in at least 25 to 30 percent in the pan.

*PSPS (Penn State Particle Separator)

- Check out these YouTube videos for examples of how to take and use a Penn State Shaker Box
- https://www.youtube.com/watch?v=RKu34pg-zaU
- https://www.youtube.com/watch?v=d-vPe8QuE34

Dairy Cattle Nutrition Facts

- Molasses can be added to improve taste/palatability and reduce dustiness
- A mature dairy cow has 32 teeth but has no upper front teeth
- Peak milk production usually occurs 2-3 weeks before peak feed intake
- Feed is the largest cost in milk production
- Cattle have 1 stomach with 4 compartments

EQUIPMENT

Pulsator

- Controls when vacuum pressure is applied inside the shell

Inflation

- Made from flexible materials; attaches to cow's teat during milking
- Normally surrounded by a rigid shell

Shell

- A hard, protective layer that houses the inflation

Milking Claw

- Collects milk from individual teats, then milk moves through tubing into main pipeline
- Attaches to shell/inflation and air tubes

Teat Dip Cup

- Teat dip fills the top compartment
- Teat dip is applied to teat by inserting it into top compartment

Milk Filter

- Used to catch dirt and debris in the milk line

Weigh Jar

- Used to estimate the amount of milk produced by an individual cow then pumped into the bulk tank

Bulk Tank

- A large tank that receives and cools the milk for pickup or delivery to a processor
- Comes in various sizes

CMT Paddle

- Used in mastitis detection
- Milk is placed into each section, and a reagent is added that helps identify cases of mastitis

Uterine Infusion/Insemination Tubes/ A.I. Sheaths

- Used to protect AI gun and semen straw from debris during artificial insemination
- Holds the semen straw in place
- Smoother plastic edges that are safer for the cow

Insemination Rod/AI Gun

- Used with semen straws
- Places semen inside the cow during artificial insemination

Artificial Insemination Glove/Palpation Sleeve

- Used to protect arm from manure and viruses that may be passed during palpation

Calf Nursing Bottle

- Used in feeding dairy calves
- Comprised of a rubber nipple, plastic cap, and plastic container
- Bottles can hold 2 to 4 quarts depending on the size

Ear Tagger

- Attaches tags to the ear of cattle

Electric Dehorner

- Used for dehorning calves
- Uses heat to burn the nerves surrounding horn and result in no regrowth of horns

Dehorning Paste

- a caustic, chemical-based compound (commonly containing sodium or calcium hydroxide) used to prevent horn growth in young calves, by destroying horn-producing cells

Balling Gun

- Used to give oral medications like boluses (pills) or a rumen magnet

Bucket Milker

- Used to extract milk from the udder
- Incorporates all parts of the milking unit:
  - Receiver
  - Pulsator
  - Claw, shell, inflation
  - Air tubing

OB Chain

- Used to assist cows when having difficulty birthing their calf (Dystocia)
- Follow link for proper attachment to calf: https://www.youtube.com/watch?v=vJRDvhb8QUQ

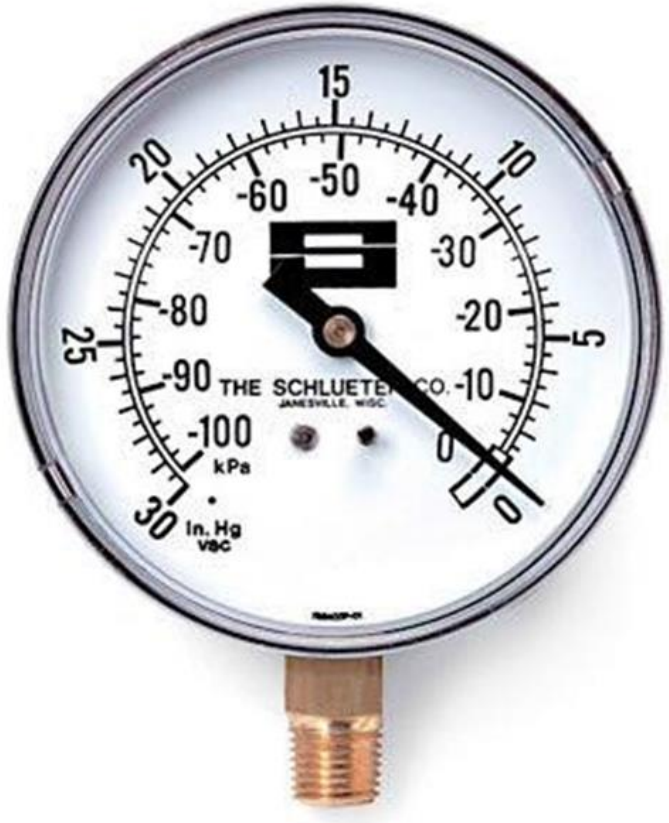
Electric Semen/Embryo Thaw Bath

- Used to warm semen/embryo to temperature

Support Arm

- Supports milk/vacuum tubing while the milking unit is attached to the cow

Vacuum Gauge

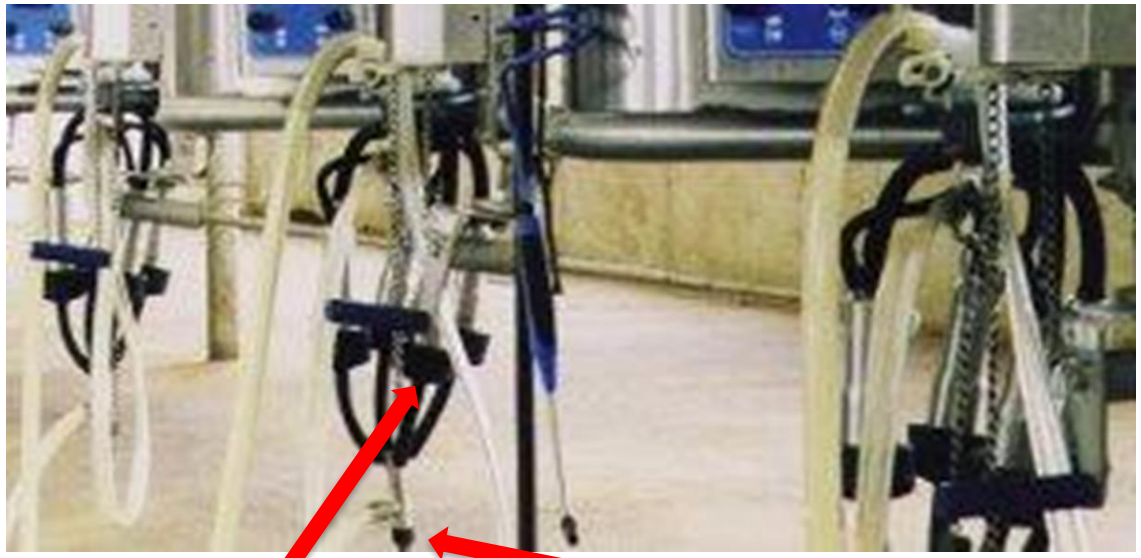


- Measures the vacuum level of the milking system

Vacuum Regulator

- Maintains vacuum levels in the milking system

Clean In Place (CIP) System



- Used in the majority of dairy farms today
- Limits time during the cleaning process

Jetter Distributor

- Distributes water or cleaning solution to the milking unit and each inflation during CIP cleaning

Elastrator

- Used to castrate bull calves
- Uses a small “elastic” band to cut of circulation to testicles until they fall off

Syringe

- Used to give injections to cattle
- Size can vary from 1 mL to 100 mL

Multidose Syringe

- Used to give injections to cattle
- Commonly used to administer vaccines

Needle

- Used to give injections to cattle
- Sizes vary in length and in gauge

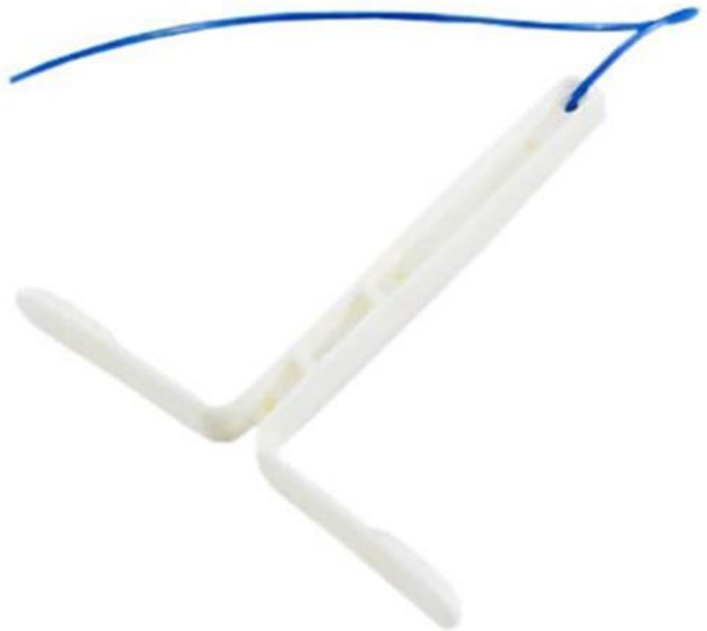
Paint Stick

- Used for marking cattle

Weaning Ring

- Inserted into the nose of calves that are not completely weaned
- Prevents calf from suckling/nursing

CIDR



- Controlled Internal Releasing Device
- Commonly covered in progesterone to sync multiple animals to be bred at the same time

CIDR Applicator

- Used to deposit the CIDR into the female reproductive tract

Colostrometer

Follow link on how to use:
https://www.youtube.com/watch?v=bL59AxJP_fA

- Used to determine the quality of colostrum
- Measures specific gravity
- Placed in a cylinder containing colostrum and floats freely
  - Green = > 50 mg/mL of immunoglobulins
  - Yellow = 20 to 50 mg/mL of immunoglobulins
  - Red = < 20 mg/mL of immunoglobulins

Refractometer

Follow link on how to use:
https://www.youtube.com/watch?v=uMZ5hsl6qws

- Used to determine the quality of colostrum
- Few drops of colostrum placed on prism and sample covered lowered
- Hold up to light source
- Value is read at the line between the light and dark areas that appear on the scale

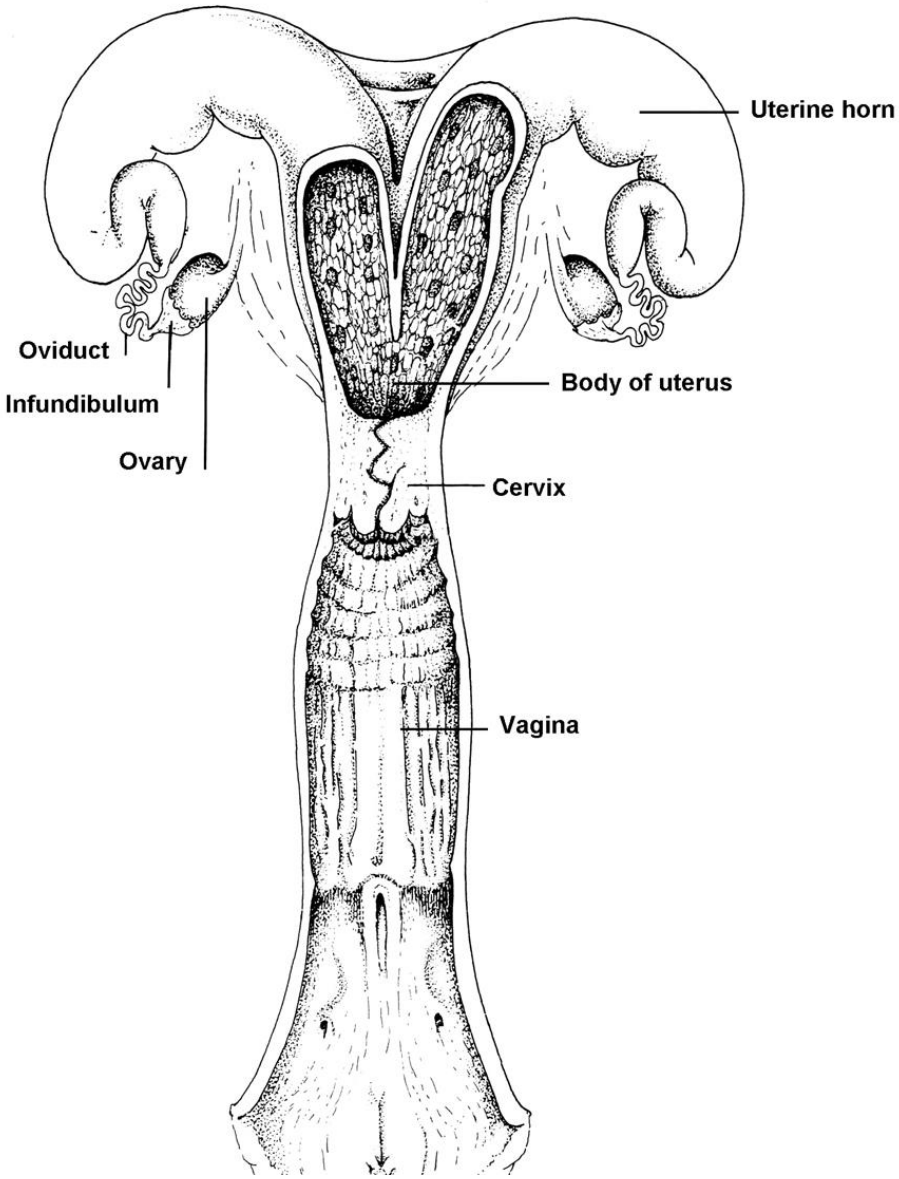
REPRODUCTION

Repro Terms

- **Freemartin**: a heifer born twin to a bull
- **Dystocia**: a difficult calving
- **Colostrum**: the first milk produced after calving; thick and yellowish milk
- **Heat/Standing Heat/Estrus**: the time period where a heifer or cow stands to be mounted
- **Gestation**: the time period where a cow is carrying a calf; pregnancy
- **Ovulation**: the release of an oocyte from the follicle
- **Estrous**: the period of time that a cow is cycling/ovulating

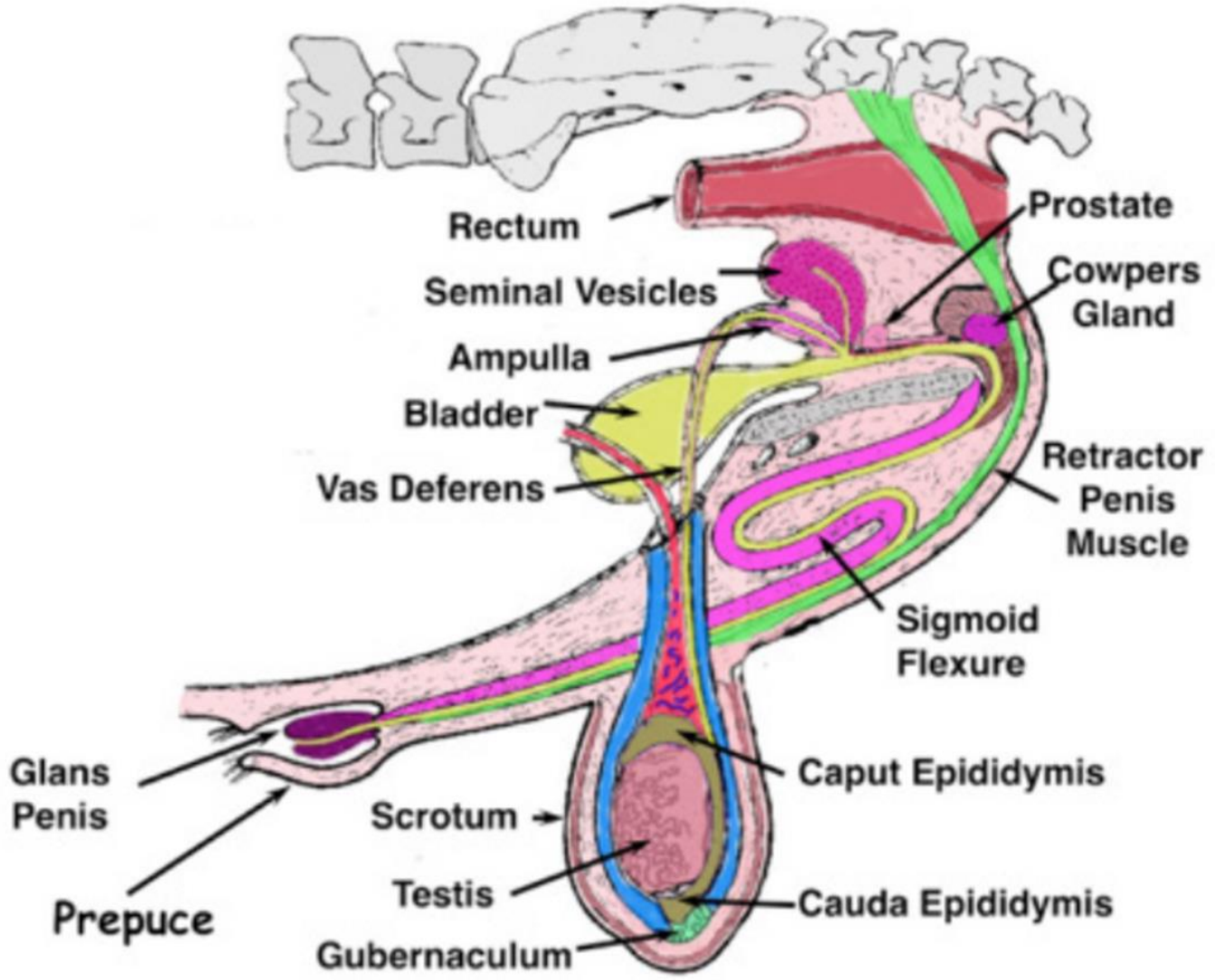
Female Reproductive Anatomy

- Vagina
- Cervix
- Body of Uterus
- Uterine Horns
- Oviduct
- Infundibulum
- Ovary
- Corpus Luteum
- Follicle



Male Reproductive Anatomy

- Testis
- Scrotum
- Prostate
- Bladder
- Glans Penis
- Sigmoid Flexure
- Vas Deferens
- Gubernaculum



Hormones

- **Testosterone**: male sex hormone; produced in the testis and drives mating behavior
- **Estrogen**: female sex hormone; high during estrus and drives sexual receptivity
- **Progesterone**: the pregnancy hormone; produced by the corpus luteum and is essential for the maintenance of pregnancy
- **Oxytocin**: released to initiate milk let down; initiated by suckling/fore-stripping

Pharmaceuticals Associated with Repro

- Lutalyse: used to bring cattle into heat (PGF2a)
- Estrumate: similar to lutalyse
- Cystorelin: used to eliminate cystic ovaries in cattle (GNRH

Artificial Insemination

  - A reproductive technique used by dairy cattle breeders that allows them to deposit semen directly into the uterus/uterine body

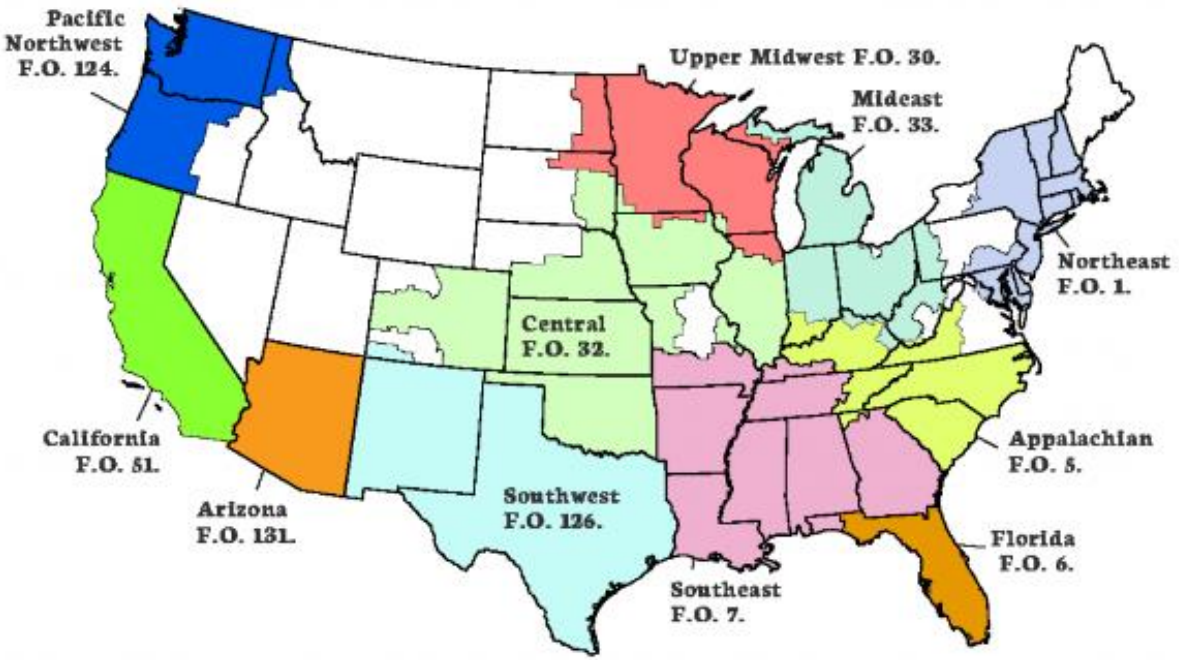
- Semen should be thawed for 45 seconds at 95 degrees Fahrenheit (+/- 3 degrees)
- Semen Straw: 0.25 mL to 0.5 mL straws that contain frozen semen; may come sexed or conventional
- Semen Tank: holds many canes that contain 10-20 semen straws per cane

Cattle Repro Facts

- Bovine Estrous Cycle: 17 – 24 Days on average 21 Days
- Cattle Gestation Period: 286 Days/9 months
- Recommended Age of 1st Calving: 18 – 24 Months
- Reproductive success is the number 1 reason for culling in most dairy herds
- Signs of estrus: standing heat/mounting, increased movement, lower milk production
- Pregnancy Detection: ultrasound, blood test, rectal palpation, lack of heat detection (least accurate)

MILK MARKETING AND ECONOMICS

Federal Milk Marketing Orders (FMMO)



For more information follow either of these links below:
https://www.idfa.org/federal-milk-marketing-orders
https://www.ams.usda.gov/rules-regulations/moa/dairy

- Establish the minimum prices dairy farmers receive for their milk
- First introduced in the 1930's
- Uses classified pricing and market-wide pooling to ensure stable and orderly marketing of farm milk
- 11 total that cover ~ 75% of total U.S. milk production
- Tennessee is covered with2 FMMO's (#5, Appalachian & #7, Southeast)

FMMO Program

- Milk Classes
  - **Class I**: fluid milk
  - **Class II**: milk used to make soft products (ice cream, yogurt, etc.)
  - **Class III**: milk used to make hard cheese products
  - **Class IV**: milk used to make butter and powdered dry milk products

For More info on FMMO:
https://www.ams.usda.gov/sites/default/files/media/DairyFMMOBooklet.pdf

1. **Establish Minimum Uniform Prices**
   1. Collect dairy commodity market prices
   2. Determine handler prices based on end-use
   3. Establish minimum uniform prices through pooling
2. **Ensures Proper Payments**
   1. Auditing: accurate and timely payments to farmers
   2. Ensure producers are paid for proper components
3. **Provides Market Information**
   1. Weekly, monthly, and annual publication of data

What affects milk pricing?

- Supply and Demand
- Component Values: fat and protein
- FMMO Class I Price and Differentials
- Transportation and Logistics Cost
  - Determined by distance to processor and cost of milk hauler
- Global Markets and Trade
- Product Type
  - Milk class
  - Organic, grass-fed

Non-Milk Income Sources

- Agritourism and Education
  - Farm tours and educational workshops
- Manure Sales
  - Marketing the sale of manure as fertilizer
- Beef Sales
- Value-Added Dairy Products
  - Cheese, yogurt, butter, and ice cream sales direct to consumer
- Crop and Land Management
  - Excess hay or feed sales; land leasing (hunting)

Marketing and Economics Facts

- Tennessee ranks 29th in milk production
- Top Importers of US Milk Products: Mexico (25%), Canada, China, and Japan
- US Largest dairy product export: **Cheese** ($2.4 billion) and Nonfat Dry Milk/Skim Milk Powder (NFDM/SMP ~ $2 billion)
- Top 5 Dairy States by milk production: California, Wisconsin, Idaho, Texas, New York
- Average Herd size in US: 337 cows as of 2022.
- Average age of Dairy Farmer: 58.1 years old

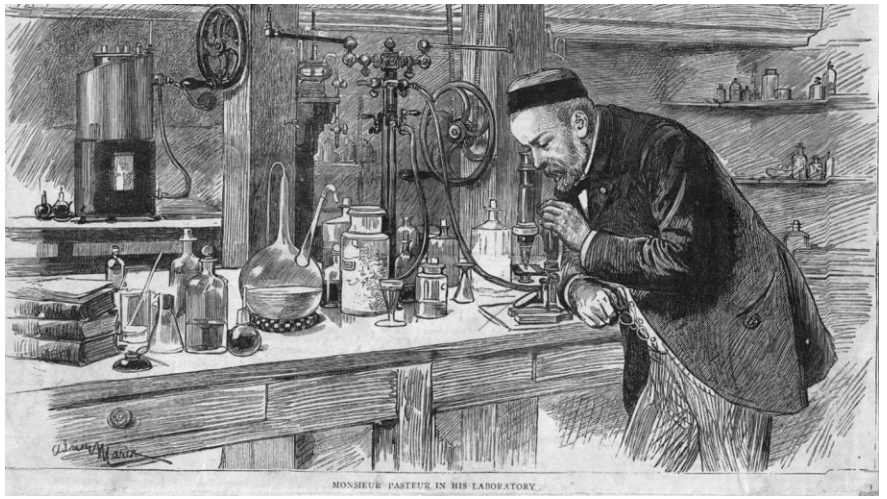
DAIRY PRODUCTS AND PROCESSING

Fluid Milk Production Steps

1. **Testing**: after collection of from the farms, raw milk is tested for quality including bacteria and antibiotic testing
2. **Separation**: a centrifuge divides the raw milk into cream and skim milk to remove any impurities in the milk
3. **Standardization**: skim and cream are recombined in precise ratios to achieve a desired fat content (0% to 3.25%)
4. **Pasteurization**: milk is heated to kill pathogens and harmful bacteria
5. **Homogenization**: milk is force through tiny openings to break down fat globules to prevent cream separation

Pasteurization

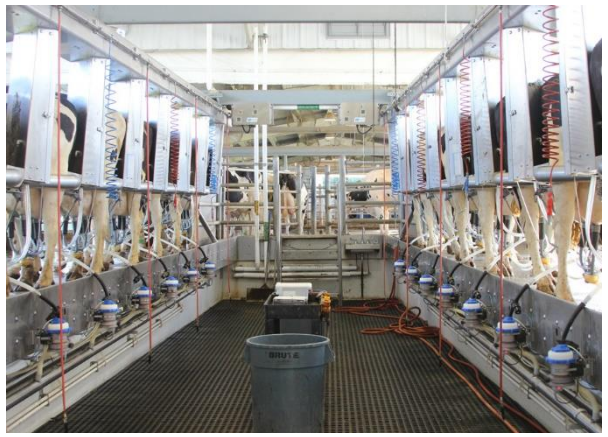
- Process of heating a liquid to kill bacteria
  - Invented by Louis Jean Pasteur in 1862
- Standard practice for milk and dairy products, juices, beer, wine, even water!



Pasteurization Techniques

- **Batch/Vat Pasteurization**: milk is heated to 145°F for 30 minutes in a larger "batch"
- **High Temperature Short time (HTST)**: most common commercial method, also called "flash pasteurization"; milk is heated to 161°F for 15 seconds.
- **Higher Heat Shorter Time (HHST)**: milk is heated to 191 to 212°F for ~ 1 second
- **Ultra-High Temperature (UHT)/Ultra-Pasteurization (UP)**: milk is heated to 280°F for 2 seconds

Path of milk & dairy products



Ice Cream Production

- **AT LEAST** 1.6 pounds of total solids to the gallon, weigh not less than 4.5 pounds to the gallon, and contain not less than 20 percent total milk solids, constituted of not less than 10 percent milkfat
- You CAN taste the difference
- Quality is based on:
  - Overrun – amount of air in the product (usually 50% by volume)
  - Fat content – 10 to 15%
  - Milk solids not fat (MSNF) – 10 to 15%
  - Texture – ice crystal size (think about fresh vs. freezer-burned ice cream)
  - Emulsifiers – mono/diglyceride fatty acids
  - Stabilizers – reduce growth of ice crystals
  - Marketing terms – superpremium, premium, regular, economy

Basics of Ice Cream Processing

Dairy pumps milk into refrigerated tank

Cream separated

Cream + Milk + ingredients mixed in a refrigerated mix tank

- Sugar
- Stabilizers
- Flavors

Mix is pasteurized 5°F higher than milk

Mix is aged 4 –24 hrs

Pumped to freezer and flavors/inclusions added

Fill containers

Put in blast freezer to harden

Deliver to retail

Off-Flavors in Products

- Bacterial/Spoilage
  - Sour: caused by acid producing bacteria
  - Malty: associated with bacteria (Streptococcus lactis)
  - Fruity: associated with bacteria (Pseudomonas)
  - Salty: high SCC, bacteria in milk
- Chemical
  - Rancid: caused by the breakdown of milk fat (lipolysis); commonly due to stress or mishandling
  - Oxidized: cardboard taste; caused by exposure to light, less likely in pigmented (yellow) containers
- Environmental
  - Feed: flavors from the cows diet (onion)
- Flat: watery, lacking richness

4 Cheese Classification Methods

Moisture

- Soft
- Semi-soft
- Semi-hard
- Hard
- Extra-hard

Curing

- Bacteria-cured
  - Internal
  - External
- Mold-cured
  - Internal
  - External
- Uncured or fresh
  - Acid
  - Acid and Heat
  - Acid and Rennet
  - Rennet

Texture

- Closed
- Open
  - Round eye
  - Mechanical

Age

- Young
- Aged

Bacteria-Cured

Internal

Cheddar, Swiss

Rarely pasteurized

External

Limburger, Gruyere

Mold-Cured

Internal

Stilton, Gorgonzola

May be pasteurized

External

Brie, Camambert

Uncured or Fresh

Acid

Cottage, cream cheese

Acid + Heat

Ricotta, Mascarpone

MUST be pasteurized

Acid + Rennet

Fresh Mozzarella

Rennet

Queso Fresco

Cheese Classification: Texture

Closed Texture

Open Texture

Round Eye

Mechanical

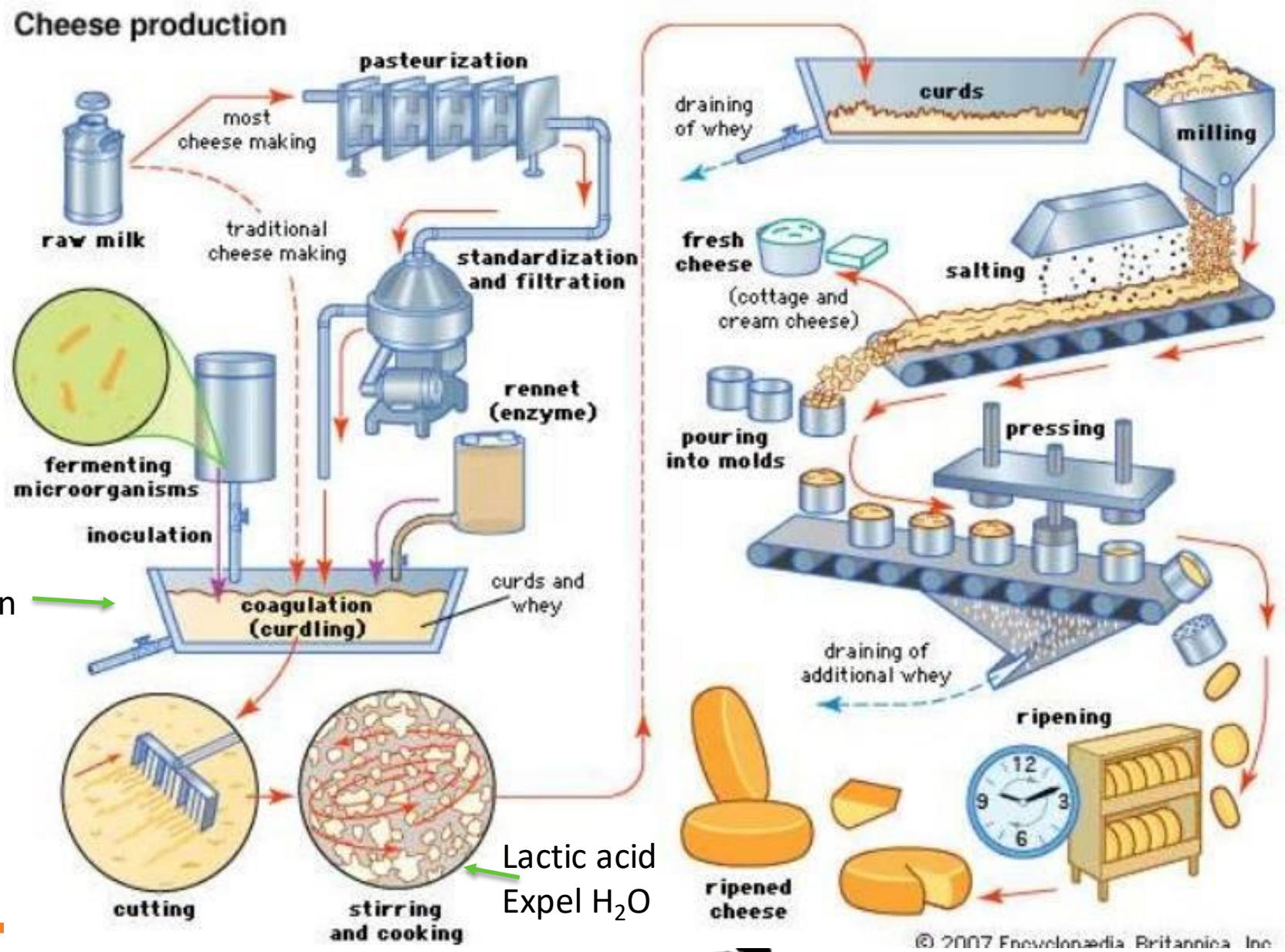
Pictures sourced from Canva.com

Cheese

- Hard
  - Cheddar
  - Colby
  - Provolone
  - Asiago
  - Swiss
  - Gouda
  - Parmesan
- Soft
  - Brie
  - Mozzarella (most popular)

Cheese!!!!

- Protein (casein) and fat are concentrated ~ 10 times in production of hard and semi-hard cheeses (i.e. 10 lbs of milk for 1 lb of cheese!)
- Moisture is the main difference
  - Hard cheeses: 50 to 55% moisture on fat-free basis
  - Semi-hard cheeses: 54 to 63% moisture on fat-free basis
  - Semi-soft: 61 to 69% moisture on fat-free basis
  - Soft: > 67% moisture on fat-free basis
- Lots and lots of variation in how to get to a certain type of cheese



30 min

Lactic acid
Expel H_2O

Dairy Products Facts

- Smallpox vaccine
  - Edward Jenner & Louis Pasteur – 1796
  - Cowpox and milkmaids
    - Used cowpox virus
  - Later, used “toxoid” of smallpox
  - Used the name “vaccine” for artificially weakened diseases
    - Vaccinus – Latin - from cows (vacca)