DAIRY CATTLE
Dairy Cattle Outline

- Breeds
- Milk Production
- Dairy Cow Biology for Milk Production
- Management
- Health Concerns
Dairy Breeds & Origins

- Holstein – Friesian - The Netherlands
- Jersey - Island of Jersey
- Brown Swiss - Swiss Alps
- Guernsey - Island of Guernsey
- Ayrshire - Scotland
- Red & White - The Netherlands
- Milking Shorthorn - British Isles
Holstein - Friesian

- Weight – 1400+
- Color – Black & White
Holstein - Friesian

• Milk Production
  – 21,091 lbs./year
  – More milk than any other breed
  – 3.66% fat
  – Lowest fat % of dairy breeds

• By far the most popular breed in North America
  – Producers are paid for sheer volume of milk
Jersey

- Weight – 900 - 1,000 lbs. – smallest breed
- Color - fawn, blackish-brown
  - Black tips – nose, tail, feet
- Milk
  - 14,396 lbs./year
  - Produces more pounds of milk per body weight
  - 4.7% fat
  - Highest fat & protein %
- Numbers are increasing due to high fat and protein %
Jersey
Brown Swiss

• Weight - 1,500 lbs.
• Color - blackish-brown or silver or gray
• Milk
  – 16,974 lbs.
  – 4.04% fat
• Calm disposition
Guernsey

- Weight - 1,100 lbs.
- Color - light red and white
- Milk
  - 14,398 lbs./year
  - 4.48% fat
- Called “Golden Guernseys” because milk has slight golden color
Ayrshire

- Weight - 1,200 lbs.
- Color - mahogany and white
- Milk
  - 15,430 lbs./year
  - 3.85% fat
- Strongpoints
  - Easy Calving
  - Longevity
  - Crossbred with other breeds for these traits
Red & White Holstein

- Weight - 1,400 lbs.
- Color - red and white
- Milk
  - 19,140 lbs./year
  - 3.68% fat
- The red color is a function of a recessive gene
Milking Shorthorn

• Weight – 1400 – 1500 lbs
• Color - Light gray to tan to dark red
• Low milk production
• Used historically as a dual purpose breed
• One of oldest breeds but numbers are rapidly declining
Milking Shorthorn
Which State has the most total milk production?

A. Wisconsin
B. California
C. Idaho
D. Michigan
The Dairy Industry
Michigan Dairy Industry

- Michigan ranks in the top ten states in number of cows, total production and production per cow.
- Michigan output of milk is increasing.
- Fewer farms, more large farms.
- 305,000 cows on 2,700 operations in the state.
- Ave. number of cows per herd = 125 (increasing)
- Dairy is the leading animal industry in the state of Michigan when comparing farm receipts.
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**Michigan Dairy Industry Trends 1994-2002**
(Source: Michigan Agricultural Statistics Service)
Worldwide Milk Industry

- Cows dominate the US milk industry
  - Some goat milk is consumed in the US
- Other species equally as important as cattle in other countries
  - Goats and sheep – southeastern Europe and in various other countries
  - Buffalo – India
  - Reindeer – Lapland (Scandinavia)
  - Horses – Russia and Mongolia
Milk Production
The largest cost associated with producing milk is:

A. Veterinary/Health
B. Labor
C. Feed
D. Facilities
What is the primary component of cow milk?

A. Lactose
B. Fat
C. Water
D. Protein
Dairy Cow Milk Composition

- Water – approximately 85%
- Solids – approximately 15%
  - Lactose 3 – 5%
  - Fat 3 – 5%
  - Protein 3 – 4%
  - Minerals/Vitamins 1%
FAT

- Fat - 3.66% (3.5-5.0)
  - Gives milk its flavor! (YUM)
  - Most variable of all milk components
  - Varies by milking, breed, cow within breed, feed, stage of lactation
  - Primarily in the form of triglycerides
  - Fat is present in an emulsion - small fat globules formed in the mammary gland with a membrane
  - HOMOGENIZATION
YUM

WHOLE MILK

- Approx. 3.6% fat
SKIM MILK

- Approximately 0.5% fat
- Why is “Fat Free” milk false advertising?
Protein

- Protein - 3.28% (3.0-3.8)
  - Highest in colostrum (antibodies)
  - Varies by breed, age of cow, stage of lactation, feed
  - Two classes of protein in milk
    - Casein - 78-85% of total protein
    - Whey or serum proteins - when milk spoils casein coagulates and precipitates, serum proteins remain in fluids giving yellowish tint
- Casein is an unstable protein suspension
  - Its tendency to coagulate is important in milk processing
Lactose

- **Lactose - 4.65% (milk sugar)**
  - Major milk solid
  - Least variable of all milk solids
  - Disaccharide (glucose-galactose)
  - Bacteria used to manufacture cheese and cultured dairy products

- **Fermentation**
  - Turns Lactose into Lactic Acid
  - Lactic acid is what gives cultured products their distinctive flavor
Dairy Cow Biology
For Milk Production
The 3 rules to successfully managing dairy cows (From the cow’s view).

• I must survive!

• My calf must survive! (Milk Production)

• Reproduce again!

If necessary, last rule is broken first
Management
Culling

• Removal of an unproductive cow from the herd
• Culling rates are farm dependent
• When?
  – During lactation
• Why?
  – Bad management
  – Bad Cow
    • Low milk
    • Not fertile
    • Health reasons
Waste Management

• Odor
• Urban pressure
• Proper manure management techniques, and timely application, knifing of liquid and till after surface application
• Nutrient leaching, N, P, K
Dry Cow Management

- Dry period is approximately 40-60 days
- Cows may be dried off abruptly or gradually if high producers (too much stress)
- Pressure in mammary gland causes the tissue to reduce milk production
  - Mastitis is of concern at this time
- Dry cows are separated from lactating cows and managed differently
Dry Cow Management

• Underfeeding dry cows reduces the success of that cow during her next lactation
• Overfeeding dry cows produces a variety of management problems
  – Fat cows
  – Reduced feed intake at lactation
  – Overfeeding Ca may cause milk fever
  – Ketosis, failure of carbohydrate metabolism
  – Other potential health concerns include increased incidence of mastitis, metritis, fatty liver
Heifer Management

• Growth rate is critical to future of heifer in the herd
  – Weight (800-875 lbs Holsteins) is important as it effects:
  – When heifer reaches puberty, breed at approximately 15 months of age to calve at two years
  – Amount of milk produced in first lactation

• Good quality alfalfa or alfalfa grass pasture supplemented with concentrate will provide adequate nutrients for proper growth

• Hay of equal quality may be substituted for pasture
Calf Management

• Cows are calved in a variety of systems
  – On pasture, if available
  – Separated and housed in calving stall (box stall)
  – In stanchion or tie stall
• Calves are weaned immediately, most are not allowed to nurse
• Colostrum is provided via milk pail

Brown Swiss calf
Calf Management

- Cows are milked and milk is not salable at this time, usually 3-4 milkings
- Calves are fed milk that is not salable or milk replacer for 6-8 weeks
- Calves are introduced to dry feed early to stimulate rumen function and to start them on dry feed as soon as possible to reduce costs
- Calves are raised separately to reduce disease and competition for feed to improve performance
Health Concerns
Mastitis

- Mastitis - inflammation of the mammary gland, may reduce production by as much as 30%.
  - Caused by a Streptococcus, Staphylococcus and/or E. coli
  - 5-10% of cases are clinical, visible chunks in milk

- Costliest disease of dairy cattle
  - Approx. $200/cow/year
  - Approx. $2 BILLION annually in US
  - Milk is dumped due to treatment
Mastitis

• Prevention
  – Avoid udder injury
  – Proper milking techniques
  – Sanitation

• CMT
  – California Mastitis Test
  – Used for diagnosis
rBST – What is it?

- Bovine somatotropin (BST) is a naturally occurring protein hormone in cattle that produces milk
- Recombinant bovine somatotropin (rBST)
  - Synthetically produced version on BST
  - Developed by Monsanto under name *Posilac* in 1994
  - Given to cows as an injection to increase milk production
  - Increases milk output by 11-16%!!!!!!!!!!!!!!
rBST - Controversy

• Banned in virtually every developed country in the world EXCEPT the United States
• January 1\textsuperscript{st}, 2008, Michigan became the ONLY state to stop use of rBST
• So what’s the big deal?
  – Studies have found that cows suffer a 25\% increase in the risk of clinical mastitis, a 40\% reduction in fertility and 55\% increased risk of developing clinical signs of lameness
  – Ill effects on humans have been speculated but NEVER have been proven yet!