Dairy Skillathon
2020
Dairy Breeds
Aryshire
Brown Swiss
Guernsey
Holstein
Jersey
Milking Shorthorn
Red and White
Breed Descriptions
Aryshire

- Originated in Scotland
- Originally known as the Dunlop
- Color: red and white
- Good feet and legs
- Excels in udder conformation
- Medium-sized frame
Brown Swiss

• Originated in Switzerland
• Because of foot and mouth disease, only 3 have been imported since 1906
• Good temperament and strong feet and legs
• Color: gray or light brown to dark brown
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
Holstein

• Originated in Europe
• Large frame
• Color: black and white
• Known for outstanding milk production
Jersey

• Originated from the Isle of Jersey (small British isle)
• Color: very light gray to dark brown or almost black
• Known for high milk fat
• Wide-range of body weight; typically smaller-framed
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
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
Anatomy of a Dairy Cow
*Be familiar with all parts of a dairy cow.
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
*3.0 ideal for Mid Lactation Cows
*3.25- 3.75 Late Lactation Cows
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
Records and Genetics
<table>
<thead>
<tr>
<th>Days in Milk</th>
<th>Milk Weight</th>
<th>Fat content %</th>
<th>Protein content %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days Open (days since calved to bred)</td>
<td># Br - breedings per pregnancy</td>
<td>Yield and production compared to herdmates</td>
<td>Average Somatic Cell Score for Lactation</td>
</tr>
<tr>
<td>Somatic Cell Score</td>
<td>Milk Weight</td>
<td>% Protein</td>
<td>%Fat</td>
</tr>
<tr>
<td>For previous test days</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DHIA Records

• Complete lactation days in milk: target around 300; extremely short = left herd early; extremely long = difficulty breeding

• Milk production and components: higher is generally better, but look at overall animal performance

• Yield Deviation and Estimated Producing Ability: + (positive) values are better than herdmates, - (negative) values are worse than herdmates

• Avg SCCS for lactation: lower is better

• Days Open: as close to 60 as possible

• # Br: lower is better

• Test day data: each category follows similar rules as shown above
Sire Summaries

- For a full explanation of sire summaries, visit this resource: [https://shawano.extension.wisc.edu/files/2010/12/Understanding-Genetics-the-Sire-Summaries-Workbook.pdf](https://shawano.extension.wisc.edu/files/2010/12/Understanding-Genetics-the-Sire-Summaries-Workbook.pdf)

How To Read Sire Information

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Holstein Juror John-ET</td>
</tr>
<tr>
<td>B</td>
<td>USA 2287161 1000% RHA-NA TV TL</td>
</tr>
<tr>
<td>C</td>
<td>USA 2124357 1000% RHA-NA TV TL TD</td>
</tr>
<tr>
<td>D</td>
<td>Dam: HOLSTEIN BETTY USA 14586168 1000% RHA-NA BL</td>
</tr>
<tr>
<td>E</td>
<td>90 EEE EV GMD DOM</td>
</tr>
<tr>
<td>F</td>
<td>TPI: +1619</td>
</tr>
<tr>
<td>G</td>
<td>Trait</td>
</tr>
<tr>
<td>H</td>
<td>STA</td>
</tr>
<tr>
<td>I</td>
<td>2 1 0 1 2</td>
</tr>
<tr>
<td>J</td>
<td></td>
</tr>
</tbody>
</table>

**Production**

- **% R SIRE DAM DAU GRP**
- **Milk** +1491 93 247 25977 244298
- **Fat** +44.3 93 +24 +47 983 903
- **Pro** +37.2 93 +23 +41 773 735
- **Vol** 56 93 100 % US

**SCS**

- **3.11**
- **1.15**
- **4.15**

**Type**

- **Type** +2.51
- **UDC** +2.25
- **PLC** +2.65
- **01-2004** 57 DAUS 46 HERDS

**Breed**

- Bill & Betty Breden
- Owner: A Company
- Controller: A Company

**Genetic Information**

- **1H08272/5/5**
- **JOHN**
Sire Summary: Block A – Identification and Pedigree Information

• Line 1: Bull’s registration name and Total Performance Index (TPI)
• Line 2: Nation Code, Registration Number, %RHA, Genetic Test Results, Final Score, Birth Date, and Recognitions
• Line 3: Sire’ Name and TPI Value
• Line 4: Sire’s Nation Code, Registration Number, %RHA, Genetic Test Results, Classification Score, Recognitions
• Line 5: Dam’s Name and Cow Total Performance Index (CTPI)
• Line 6: Dam’s Nation Code, Registration Number, %RHA, Genetic Test Results, Final Score, Classification Breakdowns, Recognitions
Sire Summary: Block B – Production Summary

• Line 1: Milk: Predicated Transmitting Ability (PTA), % reliability (R), Sire’s PTA, Dam’s PTA, Daughter and Management Group Average Mature Equivalent production

• Line 2: Fat: Predicated Transmitting Ability (PTA), % reliability (R), Sire’s PTA, Dam’s PTA, Daughter and Management Group Average Mature Equivalent production

• Line 3: Protein: Predicated Transmitting Ability (PTA), % reliability (R), Sire’s PTA, Dam’s PTA, Daughter and Management Group Average Mature Equivalent production

• Line 4: Evaluation Date, number of daughters and herds, percentage of records in progress (RIP), and percentage of daughters in U.S.
Sire Summary: Block C – Additional Genetic Information

• Line 1: Productive Life (PL): % reliability, Sire’s PTA, Dam’s PTA
• Line 2: Somatic Cell Score (SCS): PTA, % reliability, Sire’s PTA, Dam’s PTA, Percent difficult births in heifers (%DBH) when they calve for the first time (Calving Ease; Sire Calving ease (SCE) and reliability; daughter calving ease (DCE) and reliability)
• Line 3: Net merit (NM$), Cheese merit (CM$), and Fluid merit (FM$)
  • Value of the animal overall, in a cheese market, and in a fluid market
Sire Summary: Block D – Type Summary

• Line 1: Type: PTA, % reliability, Sire’s PTA, Dam’s PTA, Daughter averages for final score (DAU SC), and average age adjusted score (AASC)

• Line 2: Udder composite (UDC): Linear composite index for udder (UDC), Sire’s UDC and Dam’s UDC

• Line 3: Feet & Legs composite (FLC): Linear composite index for feet & legs (FLC), Sire’s FLC, Dam’s FLC, Body Size, and Dairy Capacity

• Line 4: Evaluation date, number of daughters (DAUS) and herds (HERDS) and effective daughters per herd (EFT D/H)
  • EFT = # DAUS/# HERDS; Example: 57 daughters across 45 herds = EFT of 1.6. The smaller the number, the greater the reliability (performance across multiple management types)
Sire Summary: Block E – Ownership Information

• Line 1: Name and State of Bull’s Breeder
• Line 2: Name and State of the Bull’s Owner or Lessee as recorded with breed association
• Line 3: Name of Bull’s Controller, as Recorded with the National Association of Animal Breeders (NAAB)
Sire Summary: Block F – NAAB Data Information

• Line 1: Semen Status
  • C – collected but not released for use yet
  • P – progeny test sire
  • F – Foreign; progeny outside the US but is actively marketed in US
  • A – Active A.I. Sire; bull sampled, has USDA genetic evaluation and semen that is available and for sale
  • L – Limited; bull with USDA published evaluation and semen available in limited quantities
  • I – Inactive A.I. Sire

• Line 2: NAAB number and sampling code, sampler controller number

• Line 3: Short name
Sire Summary: Block G – J Trait Information

• Block G: Trait Name Block – protein, fat, final classification score, productive life and somatic cell score, 18 primary linear descriptive traits

• Block H: Standard Transmitting Ability – Bull’s PTA value on a standardized scale

• Block I: Biological Extremes – When a bull’s STA value is 0.85 or more in either direction (high or low), it is highlighted and shows the bull is in the top 20% of the available population

• Block J: Trait Profiles – graphic representation of STA
Reproduction
Female Reproductive Anatomy

• Vulva
  – External opening to vagina
  – Natural and artificial breeding begins here

• Vagina
  – Sperm is deposited here in natural breeding

• Cervix
  – Guardian of the uterus
Female Reproductive Anatomy

- **Cervix**
  - Thick walled structure with annular rings
  - Feels kind of like a turkey neck
  - Resting area for sperm traveling to uterus
  - Artificial insemination rods are used to deposit semen on the other side of the cervix at the uterine body opening
Female Reproductive Anatomy

• **Uterus**
  – Uterine body
    • Short area, site of semen deposition in artificial breeding
  – Uterine horns
    • Left and right uterine horn
    • Calf will develop in one of these horns
    • 9 month gestation
    • Fun fact, same as a human gestation period!
Female Reproductive Anatomy

- **Oviduct**
  - Site of fertilization between egg and sperm

- **Ovary**
  - Produces estrogen and progesterone
  - Egg (oocyte) develops here
  - Holds several thousand tiny structures called primary follicles
  - Follicles grow in waves for the chance to potentially become an egg
  - Eggs are ovulated and fertilized if sperm is present
Male Reproductive Anatomy

- **Testicles**
- **Secondary sex organs**
  - Epididymis
  - Vas deferens
  - Penis
- **Accessory sex glands**
  - Seminal vesicles
  - Prostate gland
  - Bulbourethral (Cowper’s) gland
Male Reproductive Anatomy

- **Testicles**
  - Located outside the body in the scrotum
  - Produce spermatozoa (immature sperm)
  - Produce testosterone

- **Epididymis**
  - Compact, flat, elongated structure attached to one side of the testicle
  - Site of spermatozoa maturation into viable sperm, storage of viable sperm, and pathway out of the testicles
Male Reproductive Anatomy

- **Vas deferens**
  - Emerge from the tail end of the epididymis
  - Pathway for sperm to the penis

- **Accessory sex glands**
  - Seminal vesicles, prostate gland, and Cowper’s gland add fluid that supports and nourishes sperm

- **Penis**
  - Deposits semen in a vagina during natural breeding
Identification of Feeds and Forages
Shelled Corn
Ground Shelled Corn
Cracked Shelled Corn
Ground Ear Corn
Oats
Barley
Wheat
Soybeans
Ground Limestone
Dicalcium Phosphate (Dical)
Salt (Sodium Chloride)
Trace-Mineralized Salt
Soybean Meal
Cottonseed Hulls
Soybean Hulls
Beet Pulp
Distillers Dried Grains
Milo (Sorghum)
Wheat Bran
Urea
Alfalfa Hay
Fescue Hay
Timothy Hay
Red Clover Hay
White Clover Hay
Ensiled (fermented) Corn Silage
Green-chop (un-fermented)
Corn Silage
Categorization of Feeds

1. Forages
   a. Wet/ensiled: silage, haylage
   b. Dry: grass legume hays, alfalfa hay, peanut halls

2. Concentrates
   a. Energy: corn, barley, oats, wheat, molasses, milo (sorghum)
   b. Protein: soybean meal, cottonseed meal, corn gluten feed, brewer’s grains, dried distillers grains
   c. Vitamins/Minerals: limestone, dicalcium phosphate, traced-mineralized salt
Quality Assurance
Medication Insert

Name of Drug: OMNIBIOTIC

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.

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

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:

<table>
<thead>
<tr>
<th>Body Weight</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 lb</td>
<td>2 ml</td>
</tr>
<tr>
<td>300 lb</td>
<td>6 ml</td>
</tr>
<tr>
<td>500 lb</td>
<td>10 ml</td>
</tr>
<tr>
<td>750 lb or more</td>
<td>15 ml</td>
</tr>
</tbody>
</table>

Continue treatment for 1 to 2 days after symptoms disappear.

Caution: 1. Omnibiotic should be injected deep within the fleshly 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.

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.

How Supplied: Omnibiotic is available in vials of 100 ml.
*Be familiar with all areas on a medication label

OMNIBIOTIC
(hydrocillin)

Active Ingredients

Directions for use: See package insert

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.

Store between 2°C and 8°C (36°F and 46°F)

Keep dry and keep away from light

Net Contents: 100 ml

Distributed by
USA Animal Health, Inc.
Injection Types

• Subcutaneous injection
  • Abbreviation SubQ
  • Location: given under the skin

• Intravenous injection
  • Abbreviation IV
  • Location: given into the vein

• Intramuscular injection
  • Abbreviation IM
  • Location: given into the muscle
  • Note* ideally avoid high value cuts of meat. The neck is the preferred IM location
Diseases
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
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
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
Metritis

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

• Most costly disease in the dairy industry
Equipment
Vacuum Gauge

Measures the vacuum level of milking system
Inflation

Made from flexible materials; attaches to cow’s teat during milking; normally surrounded by a rigid shell
Teat Cup Shell

Ridged shell surrounding teat cup inflation.
Teat Dip Cup

Teat dip fills the top compartment; teat dip is applied to teat by inserting it into top compartment.
Pulsator

Controls when vacuum pressure is applied inside the shell
Milking Claw

Collects milk from individual teats, then milk moves through tubing into main pipeline; attaches to shell/inflation and air tubes
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
Insemination Rod

Used with semen straws; places semen inside cow during artificial insemination
Artificial Insemination Glove
Calf Nursing Bottle
Ear Tagger

Attaches tags to ear of cattle
Electric Dehorner

Used for disbudding calves BEFORE or DIRECTLY AFTER horn emergence
Caustic Paste

Used for disbudding calves BEFORE horn emergence

See Oregon State University for the complete poster.
Bucket Milker
OB Chain

Used to assist cows when having difficulty birthing their calf

Follow link for proper attachment to calf:
https://www.youtube.com/watch?v=vJRDvhb8QUQ
Support Arm

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

Maintains vacuum levels in milking system
Jetter Distributer

Distributes water/cleaning solution to milking unit during CIP cleaning
Clean In Place (CIP) System

- CIP cup
- Duckbill drain
Elastrator

Used to castrate bull calves
Syringe

Used to give injections to cattle
Multi-use Syringe

Used to give injections to cattle
Cow Magnet

Given to cattle to collect any metal (screws, nails, etc.) that may be eaten and could puncture the rumen (Hardware disease).
Paint Stick

Used for marking cattle
Weaning Ring

Inserted into nose of calves that are not completely weaned; prevents calf from nursing
Colostrum instruments

- Colostrometer
- Refractometer
Colostrum instruments

**Colostrometer**
- 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

Follow link on how to use: [https://www.youtube.com/watch?v=bL59AxJPFfA](https://www.youtube.com/watch?v=bL59AxJPFfA)

**Refractometer**
- 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

Follow link on how to use: [https://www.youtube.com/watch?v=uMZ5hsl6qws](https://www.youtube.com/watch?v=uMZ5hsl6qws)
Nutrition
*Be familiar with parts of a ruminant digestive system and flow of feed through system
Rumen
Omasum
Abomasum
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
TMR

Very long particle size – can lead to sorting and inefficient feed intake

Good mixture of particle length – difficult to pick out individual feed types which limits sorting
### Recommended distribution of particle size (percent remaining on each screen) for corn silage, haylage, and TMR samples

<table>
<thead>
<tr>
<th>Screen</th>
<th>Pore Size (inches)</th>
<th>Particle Size (inches)</th>
<th>Corn Silage</th>
<th>Haylage</th>
<th>TMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Sieve (19 mm)</td>
<td>0.75</td>
<td>&gt; 0.75</td>
<td>3 to 8%</td>
<td>10 to 20%</td>
<td>2 to 8%</td>
</tr>
<tr>
<td>Middle Sieve (8 mm)</td>
<td>0.31</td>
<td>0.31 to 0.75</td>
<td>45 to 65%</td>
<td>45 to 75%</td>
<td>30 to 50%</td>
</tr>
<tr>
<td>Lower Sieve (4 mm)</td>
<td>0.16</td>
<td>0.16 to 0.31</td>
<td>20 to 30%</td>
<td>30 to 40%</td>
<td>10 to 20%</td>
</tr>
<tr>
<td>Bottom Pan</td>
<td>&lt; 0.16</td>
<td>&lt; 0.16</td>
<td>&lt; 10%</td>
<td>&lt; 10%</td>
<td>30 to 40%</td>
</tr>
</tbody>
</table>

https://extension.psu.edu/downloadable/download/sample/sample_id/963/
Penn State Shaker Box

2019 recommendations for Total Mixed Ration only

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

*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