Managing On-Farm Feed Mills
Why is it important?

1. Food safety
2. Accountable
3. Traceable
4. Feed is the largest cost of production
5. Predictable animal performance
Objective

• To source wholesome ingredients, process them, mix balanced diets, and deliver them to barns

• Considerations:
  – Costs
  – Species
  – Barn feed equipment
  – Feeders
Sourcing Feed Ingredients

- Qualifying suppliers
- Qualifying truckers
- Biosecurity rules
- Delivery contracts
- Tolerances
- Specifications
- MUST BE TRACEABLE
Receiving Feed Ingredients

• Bulk or bagged
• Inspection, sampling
• Assign lot numbers
• Delivery log
• Receiving pit
• Receiving liquids
• Blowing ingredients
On-Site Testing of Ingredients

• **Representative** sampling
• Colour, odour, viscosity, temp, particle size, etc.

• **Tolerances** checklist
  – Foreign material, dockage
  – Seed impurities
  – Chemical, physical hazards
  – Ergot, smut, mycotoxins

• **Specifications** checklist
• Moist, CP, ADF, Ca, P, fat
• Sample storage, labeling
Bulk Ingredient Storage

- Bin capacity & assignment
- Bin cleaning, repairs
- Bridging
  - Live bottom
  - Flow vibrators
- Aeration
- Inventory, contracts
- First-in, first-out
Particle Size Reduction

• Hammer, roller, disc mills
• Smaller particle ↑power, ↓thruput, ↑wear
• Smaller particle ↑feed efficiency, intake??
• Screen size, tip speed vs. gap
• Ingredient dependent
• Dehulling, blowing
• Equipment installed in tandem
Accessory Grain Equipment

- Offers GREAT OPPORTUNITIES
- Grain dryer
- Scalpers
- Dehullers
- Blowers
- Oil pressing
- Vibro-sieving
• OPPORTUNITY INGREDIENTS
• Tote hangers
• Proportioner mill

Overhead Bins

- Ground oats
- Ground barley
- Ground wheat, triticale
- Soybean meal
- DDGS
- Limestone
- Monodical
- Ground 2/3 pea, 1/3 full-fat canola
- UNASSIGNED

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Warehouse Management

- Bagged ingredients
- Totes, pallets, tubs
- Floor plan
- Inventory
- Sanitation
- Pest control
- First-in, first-out
Storage & Handling of Medications

- Drug concentration
- Properly identified containers in marked area
- Expiry dates
- Cross-contamination
  - Scoops
  - Weighing containers
  - Scales, mixer, bins used
  - Turnheads, legs, augers

- Corresponding records:
  - Medication inventory
  - Medication purchased
  - Daily production log

- DRUG RESIDUE TESTING
Scales & Metering Devices

• Calibration
• Standardization

Check weights
Scales, Metering Devices

- **Appropriate range**
- **Accuracy** => tolerance or variance from true wt.
  - ✓ 0.1% of scale capacity or +/- 1 graduation, whichever is greater for new scales (<1y)
- **Sensitivity** => smallest weight change that will cause the indicator to move
- **Graduation** => finest division of readout display

**SCALE CHECK:**

<table>
<thead>
<tr>
<th>Scale ID _____________________</th>
<th>Tolerance, kg _____________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1% of capacity or ± 1 display graduation</td>
<td>Before</td>
</tr>
<tr>
<td>Expected wt, kg</td>
<td>Actual wt, kg</td>
</tr>
<tr>
<td>Light reference weight ID ______</td>
<td>______</td>
</tr>
<tr>
<td>Heavy reference weight ID ______</td>
<td>______</td>
</tr>
<tr>
<td>Added (light + heavy)</td>
<td>______</td>
</tr>
<tr>
<td>Accept (circle)</td>
<td>Reject (circle)</td>
</tr>
<tr>
<td>Initials _________</td>
<td>Date ___________</td>
</tr>
<tr>
<td>yyyy, Mmm, dd</td>
<td>yyyy, Mmm, dd</td>
</tr>
</tbody>
</table>
Mixing Feeds

- Mixer types
- Order of addition
  - Bulk ingredients
  - Hand-adds
  - Liquids
- Mixed batch lot #

- Mixing time
  - Emptying
  - Capacity at testing
  - Collection of samples
  - Salt, tracers
### Mixing Time Records

- **Lab results**
- **CV% calculation**

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Value of sample X</th>
<th>(X-mean)</th>
<th>(X-mean)^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.985</td>
<td>0.179</td>
<td>0.032</td>
</tr>
<tr>
<td>2</td>
<td>1.625</td>
<td>-0.182</td>
<td>0.033</td>
</tr>
<tr>
<td>3</td>
<td>1.715</td>
<td>-0.092</td>
<td>0.008</td>
</tr>
<tr>
<td>4</td>
<td>1.625</td>
<td>-0.182</td>
<td>0.033</td>
</tr>
<tr>
<td>5</td>
<td>1.950</td>
<td>0.144</td>
<td>0.021</td>
</tr>
<tr>
<td>6</td>
<td>1.800</td>
<td>-0.007</td>
<td>0.000</td>
</tr>
<tr>
<td>7</td>
<td>1.800</td>
<td>-0.007</td>
<td>0.000</td>
</tr>
<tr>
<td>8</td>
<td>2.025</td>
<td>0.219</td>
<td>0.048</td>
</tr>
<tr>
<td>9</td>
<td>1.625</td>
<td>-0.182</td>
<td>0.033</td>
</tr>
<tr>
<td>n = 10</td>
<td>1.915</td>
<td>0.109</td>
<td>0.012</td>
</tr>
</tbody>
</table>

**Sum =>** 18.065 \(\frac{0.219}{n-1}=\text{variance}\)

**Mean=sum/n =>** 1.807 \(0.024 \leq \text{variance}\)

**Stdev=sqrt variance =>** 0.156 \(0.156 \leq \text{stdev=sqrt variance}\)

**CV%=(stdev/mean)*100 =>** 8.640
Mixing Sequence

1. Diets for “market-ready” animals
2. Mix script-medicated diets 1\textsuperscript{st} (2.5x)
3. Mix MIB-level medicated diets 2\textsuperscript{nd}
4. Mix zero-withdrawal diets 3\textsuperscript{rd}
   • Watch for cross-specie toxic meds
   • Use granulated drugs when possible
Sequencing Records

- **Daily Production Log**
  - List equipment involved
  - Manufacture date
  - List feeds in order in which they passed
  - Amount mixed
  - Medication & level or not medicated
  - Flushing or cleaning used?

- Mixed feed lot number
Flushes

- Type & amount of flush material
- Additional flush material used?
- Flush used as ingredient in feeds with same medication
- Feed only to approved species
- When stored, label according to medication
Flushed Records

- Noted where?
- Taken to landfill?
- Who bagged it?
- How was it labeled?
- Where was it stored?
- Where was it used up?
- Dust from sweeping, vacuumed, cyclones
Pelleting, Crumbling

- “Birds can see very well
- Waste feed and time searching
- Prefer pellets over fines
- Prefer larger fines over smaller fines
- Prefer courser feeds over finer feeds
- Prefer largest pellet that suits them
- Rake feed to make choices
- Rake feed if different colors or textures present”
Loadout Bins

- Medicated diets to labeled loadout bin
- Flushing and sequencing
- Mixed in error => it’s a recall
- Re-routing back to mixer
- Manufacturing tag transfer from mixer to loadout bin
Feed Distribution

- Truck compartments
- Manufacturing tag follows feed
- Sequencing and flushing
- Medicated in aft compartment(s)
- Contaminating broom
- Manifolds

• Records:
  - Truck log
  - Tag placed/removed
  - Consecutive lot #s

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Diet Production & Testing

- Ordering feed vs. scheduling
- Visually checking farm feed bins
- Feed Manager ↔ nutritionist
- Changes in feed formulation
- 3-sieve particle size testing
- Lab analyses vs. NIRS
- Chemistry vs. calculated
- Diet tolerance, specs
Feed Recalls

FEED MIXED IN ERROR
Where is it ??

• Mixer ?
  yes
  Redirect to bagging
  no

• Loadout ?
  yes
  Redirect to receiving pit
  no

• Truck ?
  yes
  Return truck to feed mill
  no

• Farm bin ?
  yes
  Lock bin; vaccum out
  no

• Being fed ?
  yes
  Notify stockperson
  no

• Stockyard ?
  yes
  Notify packing plant, CFIA
  no

• Cooler ?
  yes
  Notify packing plant, CFIA
  no

• Pork sold?
  yes
  PORK RECALL
  no

• Records:
  – Investigation report
  – Preventing steps
Maintenance and Repairs

• Commissioning equipment
• Scheduled maintenance
• Repairs
• Equipment replacement
• Contractors
  – Biosecurity
  – Workers Comp
Training

• Training program
  – In-house
  – External
    • HACCP
    • Medications
• CFIA licensing ???
• Who can do what?

Record of Training

I hereby acknowledge that the following employees were present during the entire session on Familiarization with XXXXXX, which I taught on 199_, yyyy 99, at Main Office building.

The following material was presented:

 Persons receiving training:

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Trainer:

Name
Position

Date: yy Mmm dd
• Feed Samples
  – As long as they afford evaluation (for drug target or residue)
  – X months after flock ended or meat animals slaughtered

• Documents
  – 3 years minimum
  – Fire proof location
  – Double lock
  – Investigations of non-compliance
  – Corrective actions
  – Specs, residue results
  – Distribution records
Administrative Procedures

• Shopping for commodities
• Hedging, risk-spreading
• Tenders and contracts
• Quotes and purchasing
• Accounting procedures
• Process control
Conclusions

- On-farm feed milling can be a complex activity
- Multitasking, but it is a process
- Large $ tied in assets, inventory
- Realistic QC, QA, HACCP
- Avoid mixing medicated feeds
- Predictable animal performance
- Who’s the *doer*, who’s the *thinker*?