


Farm Energy IQ

Farms Today Securing Our Energy Future



On-Farm Biomass Pellet Production

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On-Farm Biomass Pellet Production

Overview

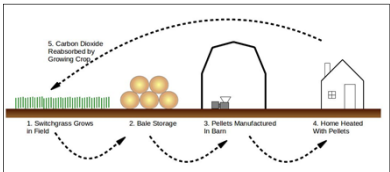
- Introduction
- Pelleting equipment
- Keys to successful operation
- Markets and uses for pellets

The Pellet Industry

- Primarily producing wood pellets
- Started as a way to use sawdust at sawmills
- Large operations – tons per hour
- Two main markets
 - Domestic – home heating (dominant market in the Northeast U.S.)
 - International – power plants in Europe, Asia

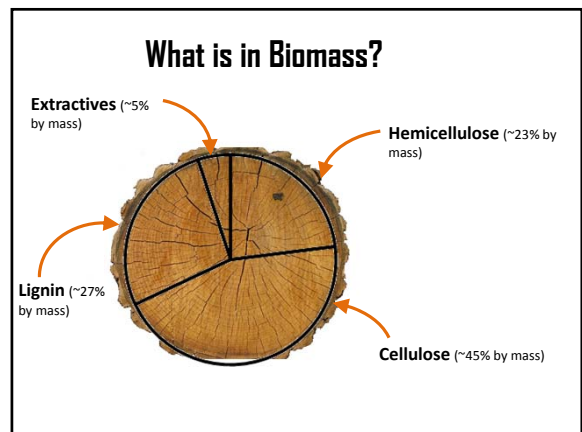
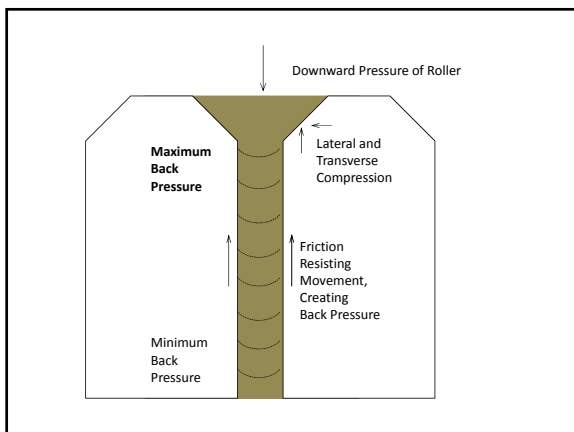
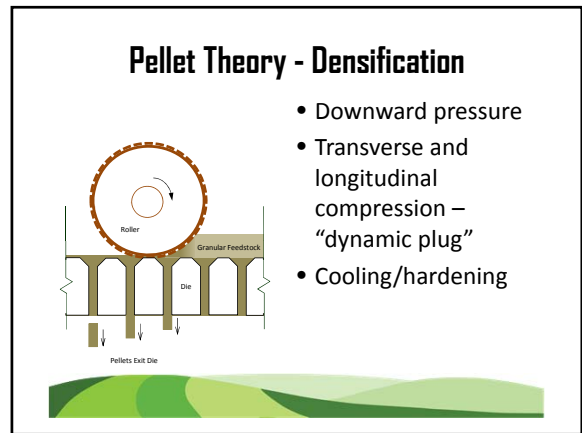
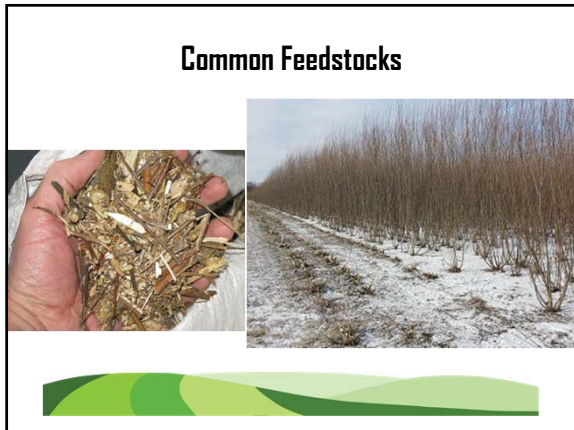
Opportunities for On-Farm Production

- Can grow feedstock – wood or grass
- Smaller equipment is available
- Produce own heating fuel or sell to others
- Buy local food, buy local energy!

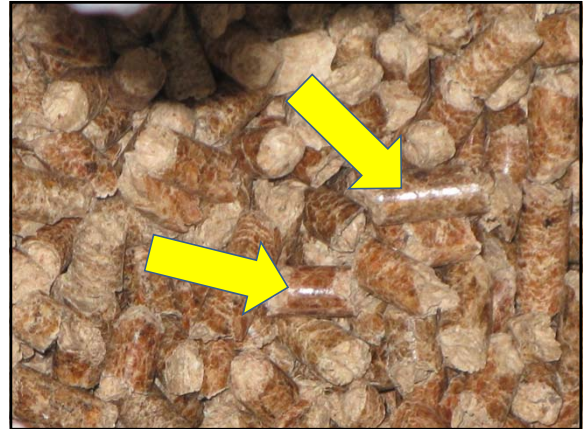


Common Feedstocks





Pellet Theory - Binding



Harvest



Storage



Storage



Grinding



1. Tub grinder
2. Hammer mill
3. Collection system

Conditioning



Pelleting



Cooling

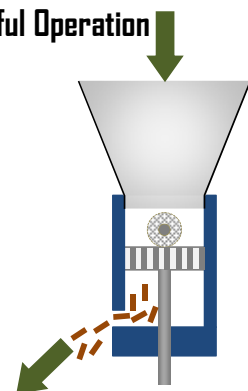
- As it cools, the pellet dries and hardens
- Commercial facilities use cooling bins with forced air movement
- Small operations can use open air drying on racks or similar



Packaging

- Plastic, 18-kg (40-lb) bags are most common
- Must be sealed to prevent moisture uptake
- Supersacks work for bulk sales

Keys to Successful Operation

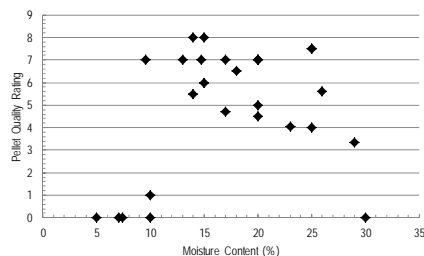


Keys to Successful Operation – Particle Size

- Measured by screen size of grinder, nominally the maximum dimension of particle
- Too small – excessive grinding energy
- Too large – difficulty passing through die
- Recommendation – use screen size no larger than diameter of die

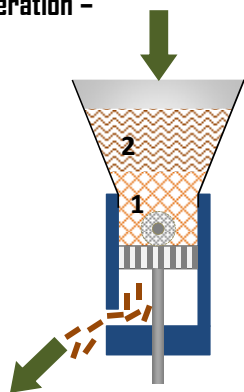


Keys to Successful Operation – Moisture Levels

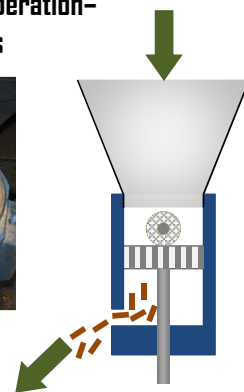


Keys to Successful Operation – Pre-Mixes

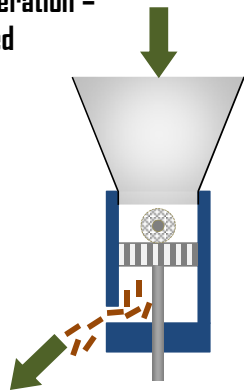
- Start batch with pre-mix (#1) to develop dynamic plug that flows and provides back pressure
- Follow with feedstock (#2)



Keys to Successful Operation – Die Tightness

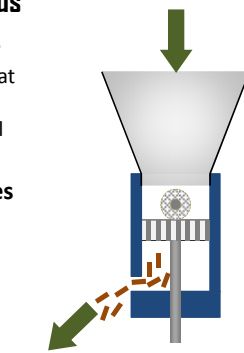


Keys to Successful Operation – Pelletizer Speed



Keys to Successful Operation – Loading Methods

- **Open hopper machines**
 - Loading the material all at once (“dumping”) works better than does gradual feed
- **Sealed hopper machines**
 - Gradual feed may be better



Keys to Successful Operation - Finishing

- Feedstock can harden and stick if left in the die to cool
- Finish each run with a weaker material that will not clog the die
- Dried distiller grains (DDGs) and soy have both proven effective



Keys to Successful Operation - BE SAFE!

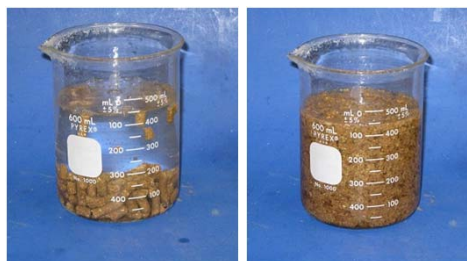
- Potential hazards include
 - Dust (inhalation, combustion)
 - Moving parts
 - Hot parts
- Dress appropriately
- Assess risks
- Act appropriately



Markets and Uses - Heat



Markets and Uses - Sorbents



Markets and Uses - Bedding



Markets and Uses - Mulch



Example Startup Costs

Description	Amount per Acre	Total Cost
Startup Costs:		
Fixed Costs - Equipment	\$1,103.13	\$44,125.00
Variable Costs – Site Prep	\$72.11	\$2,582.64
Variable Costs – Planting	\$60.37	\$2,241.12
Variable Costs – Establishment	\$72.33	\$2,205.53

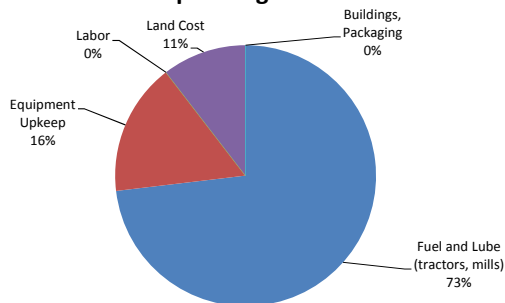


Example Operating Costs

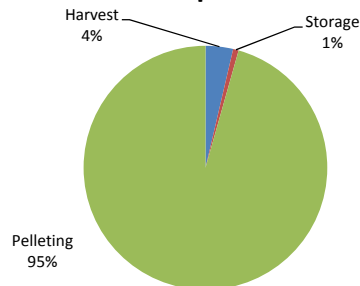
Description	Amount per Acre	Total Cost
Ongoing Costs:		
Variable Costs – Harvest	\$41.23	\$1,649.05
Variable Costs – Storage	\$3.36	\$134.45
Variable Costs - Pelleting	\$194.95	\$7,798.00
Total:	\$239.54	\$9,581.50

That's \$ 88.72 per ton of pellets (not including labor)

Operating Costs



Labor Requirements



That's 12.5 hours per ton of pellets

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Pelleting Demo



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Questions?

