Collecting Agricultural Film for Recycling or Disposal

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Relevant Experience

- Consultant to American Plastics Council (APC) on increasing plastics recycling since 1991
  - Worked on agfilm collection and market development under APC Technical Assistance Program
- Advisor to UVM Extension on behalf of APC on USDA project (1996-1998)
- Recycling collection expertise developed over last 15 years
- Two farms in family – corn and milk/cheese

Focus of Presentation

- Pass along lessons learned in designing a *sustainable* collection and recycling program for agfilm

What type of Agfilm?

- **Bale/Silage wrap**
  - White, tacky linear LDPE film used to wrap round hay bales and keep them air- and moisture-tight.
- **Hay sleeves/silage bags** (ag bags)
  - Two layers of LDPE plastic, typically white and green, bonded together to form a sleeve.
- **Bunker silo covers**
  - Black LDPE film used to cover tops and sides of silage/hay in bunkers (sometimes reused on farm)

How Much in Vermont?

- UVM Extension survey (1995) - 7.5 lbs of plastic film use annually per dairy cow
- Canadian estimates - 30 lbs (bale wrap) per full grown cow
- Thistle Hill Farm (VT) - 22.5 lbs/milking cow
- So if 154k dairy cows in Vermont, could be between 1.2 and 4.5 million lbs of film used per year

How much bale wrap per farm?

- Use varies across farms
  - Wrap 2-4 times
  - Mil thickness
  - Mix of round and square bales fed out
- Farms of 70 cows using round bales might generate 500 – 1500 lbs per year
- Generated when feed needed (mostly winter months)

Where does it go now?

- Landfills and WTE (out of state)
- Buried on-site
- Burned on-site
- UVM Extension survey (Dec 1995) found: "*Of those that used ag films, 25% reported they burn on the farm and 25% reported they bury film on the farm"*
- VT Ag Dept and ANR get calls regularly about improper disposal

How could Vermont develop a sustainable recycling program?

- Collection pilots 1996 – 1998
- Find at least two reliable markets for material
- Collect it for equal to or less than the cost of collection and disposal
  - If tip fee is $80/ton then must manage film for 4 cents/lb or less
  - In 1996-1998 revenues for film were lower!

Types of Collection Pilots

- Satellite collection locations with roll-offs
- Central collection site with baler
- Pick up from the farm
- Pre-educate farmers for participation

Satellite Collection Location

- Pre-register farmers for drop-off into roll-off containers then transfer to processing facility to bale for market
- Pros:
  - Less distance for farmers to travel to deliver film
  - Compactor could be added to roll-off to increase density
  - Could be added to any drop-off/transfer station
- Cons:
  - At best transporting a few tons in a 40 yard container

Economics

- Costs include:
  - Deliver to drop-off (.445/mile x 25miles / 500 pounds = 2 cents/lb) – Cost to farmer
  - Roll-off rental and transfer ($150 / 2 tons = 4 cents/lb)
  - Bale and transport to market (3 cents/lb)
  - Total Cost = 7 - 9 cents per pound
  - Assumes no revenue

Reality

- Farmers brought less than 500 lbs. farm
- Roll-off didn’t fill over two day collection
- Bale facility waited until they had enough material to “make a bale” and paper dust covered material
- Made bale then waited for more bales to market – mold grew

Central Collection Location with Baler

- Designate location with baling capabilities (or use mobile baler)
- Pros:
  - Minimize handling costs to program
  - Can prepare for market on location
- Cons
  - Longer distances for farmers to transport small amounts of material
  - Mobile baler - Cost of moving baler around for potentially small amounts of material

Economics

- Costs include:
  - Deliver to central facility (.445/mile x 55miles / 500 pounds = 4 cents/lb)
  - Bale and transport to market (3 cents/lb)
  - Total Cost = 7 cents per pound
  - Mobile baler costs – depends on lbs delivered to satellite site
  - Assumes no revenue

Reality

- Baling costs were much greater since they weren't used to baling film; film had to be hand fed into hopper
- Contamination got in baler and dirtied it for the primary use - paper bales
- Weren't interested in repeating the pilot

Collect from the Farm

- Prearranged appointments to farms to collect over 200 pounds per farm
- Hire packer truck/driver at $85 per hour
- Put together collection route to maximize pounds collected per hour

Economics

- If loading and transport could be done efficiently, *might* load a ton per hour
- Could deliver directly to bale facility
- Costs:
  - Collection at $85/hour = 4 cents/lb
  - Baling = 3 cents/lb
  - Total = 7 cents/lb
  - Assumes no revenue

Reality

- Farms spread out – hard to get one ton per hour
- Need container to efficiently load agfilm
- Farmers need prescreening to ensure dirty material isn't mixed in with clean in the packer

Market Results

- First pilot used broker – materials rejected
- Second pilot set market conditions:
  - proximity to Vermont
  - production of an end-product in the Northeast or the U.S.
  - willingness to accept test bales
  - willingness to provide detailed information on test bales

Typical Market Specifications

- Clean and dry (*Think Plastics, Canada* says dry not essential for bale board)
- Free of stones, dirt and manure
- Loads of 20k – 40k
- Value – 0 - 4 cents per lb baled

Markets Tested (1996 – 1998)

- Trex (lumber) – moisture, pigment, dirt
- Reel Manf. (Black reels) – dirt, manure, etc.
- Bag Manf. – odor, mold, dirt
- Teneco (Tolling for market) – Dirt
- Atlantic Poly (PE bags and bin skins) – dirt and moisture
- Samples to 7 others

Lessons Learned

- Pre-screen and educate participants
  - 24 – 45% of material rejected at 3 collections
- Work with larger farms first
  - Consolidate larger quantities on the farm
  - Arrange milk runs to pickup or larger deliveries

Lessons Learned

- Educate on handling practices to keep film clean and dry
  - Limit dirt when feeding bale out
  - Hang plastic up to promote drying (nail)
  - Store to prevent recontamination
  - Heated area speed drying
- Plan collection for early spring or late August (when less busy) but:
  - One day too short due to weather constraints
  - Two-three week or permanent best

Lessons Learned

- Identify market ahead of time, or have disposal as backup plan
- Option to market with other material – boat wrap from marinas?
- Be clear when talking to markets about what type of film you are collecting

Conclusions

- Keep silage films clean and dry whether for recycling or disposal reduces labor costs
- Composting film may be future opportunity
- Difficult to enforce laws against burning and burial
- Continue to educate farmer about environmental and public health impacts of open burning and liability from dumping (loss in property value)