

CONTROLLING BUCKTHORN WITH HOGS AND SHEEP

CUTTING FEED COSTS WITH FOOD WASTE
BY NANCY LUNZER

THERE ARE THREE PARTS TO THIS PROJECT

- ▶ PART ONE: REMOVING BUCKTHORN USING HOGS
 - ▶ PART TWO: FEEDING HOGS GROCERY STORE WASTE FOOD
 - ▶ PART THREE: PREVENTING BUCKTHORN FROM RETURNING USING SHEEP
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BUCKTHORN IS AN EXOTIC INVASIVE SPECIES

- ▶ IT FORMS AN IMPENETRABLE UNDERSTORY AND CAUSES LONG-TERM DECLINE OF THE FOREST.
 - ▶ IT OUT COMPETES NATIVE TREE SEEDLINGS AND WOODLAND PLANTS.
 - ▶ BUCKTHORN THICKETS SHADE OUT OTHER SPECIES AND LIMIT PLANT DIVERSITY
 - ▶ THE SALE OF BUCKTHORN WAS HALTED IN THE 1930'S.
 - ▶ IT IS A HOST TO OAT CROWN ROT AND A WINTER HOST TO THE SOYBEAN APHID.
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EARLY SPRING AND LATE FALL IS THE BEST TIME TO IDENTIFY BUCKTHORN.



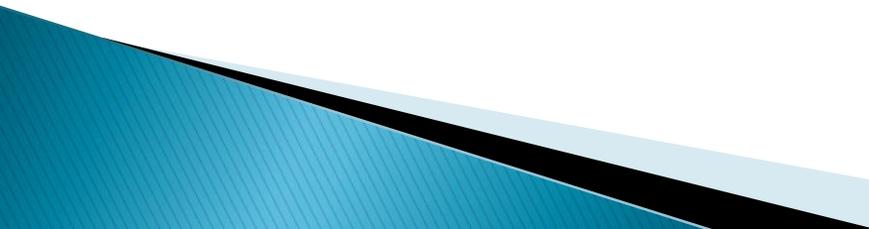
BUCKTHORN HAS THE FIRST GREEN LEAVES OF SPRING AND THE LAST GREEN LEAVES OF FALL





**BUCKTHORN
WAS IMPORTED
BY EARLY
SETTLERS AS A
QUICK-
GROWING
WINDBREAK FOR
PRAIRIE FARMS.**

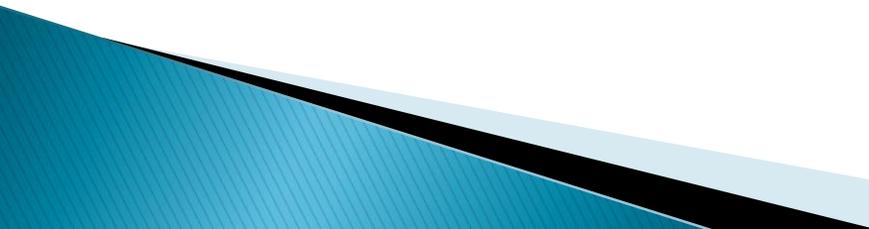
BUCKTHORN IS A MAJOR ECOLOGICAL PROBLEM IN MINNESOTA FORESTS

- ▶ MATURE BUCKTHORN PRODUCES DARK BLUE BERRIES THAT ARE EATEN BY BIRDS.
 - ▶ THE BERRIES HAVE A LAXATIVE EFFECT AND PASS THROUGH THE BIRDS AND ARE SPREAD THROUGHOUT THE BIRD'S HABITAT.
 - ▶ THE BUCKTHORN SEEDS REMAIN VIABLE IN THE SOIL FOR UP TO FIVE YEARS.
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TRADITIONAL METHODS TO REMOVE BUCKTHORN

- ▶ **CLEAR CUTTING – FOLLOWED BY YEARLY HERBICIDE TREATMENTS FOR 4–5 YEARS.**
- ▶ **HERBICIDE TREATMENT – OVERSPRAY ALL THE UNDERBRUSH AND RE-APPLY ANNUALLY OR CUT THE BUCKTHORN AND SPOT TREAT STUMPS ANNUALLY.**
- ▶ **HAND PULLING – WITH WEED WRENCH FOLLOWED BY YEARLY PULLING.**
- ▶ **CONTROLLED BURNING IS SOMETIMES USED BUT ONLY IN SAVANNAH AND PRAIRIE AREAS.**

TYPICAL COSTS FOR BUCKTHORN REMOVAL

- ▶ INITIAL MECHANICAL REMOVAL OF MODERATE BUCKTHORN \$170-\$250 PER ACRE.
 - ▶ ADDITIONAL YEARLY COST OF HERBICIDE TREATMENT IS \$150/ ACRE IF APPLIED BY THE LANDOWNER – \$300 IF CONTRACTED
 - ▶ INITIAL REMOVAL MUST BE FOLLOWED BY SPOT SPRAYING WITH HERBICIDE OR HAND-PULLING FOR 4 – 5 YEARS OR UNTIL THE SEEDBANK IS DEPLETED.
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THE TARGET AREA

- ▶ THE MAIN SOIL TYPES ARE BRENNYVILLE COMPLEX AND BRENNYVILLE WET CEBANA. THESE SOIL TYPES ARE HEAVY, WET, CLAY AND VERY ROCKY.
- ▶ THE UPPER CANOPY IS OLDER ASPENS AND A SECONDARY CANOPY OF MAPLES AND OAKS.
- ▶ THIS AREA IS HOME TO 7 SPECIES OF REPTILES AND AMPHIBIANS.
- ▶ 10 SPECIES OF MAMMALS AND
- ▶ 47 SPECIES OF BIRDS
- ▶ THE WOODLANDS AND PASTURES DRAIN INTO TWO EPHEMERAL PONDS AND ONE PERMANENT POND WHICH OVERFLOW INTO THE GROUNDHOUSE RIVER. THE GROUNDHOUSE FLOWS TO THE SNAKE RIVER.

THE IMPACT OF TRADITIONAL BUCKTHORN REMOVAL METHODS FOR THIS SITE.

- ▶ USE OF HERBICIDES COULD RESULT IN LEACHING INTO SENSITIVE WOODS AND WETLANDS.
 - ▶ CLEAR-CUTTING WOULD REMOVE THE WINDBREAK TO THE FARMSTEAD
 - ▶ CHEMICALS AND SOIL EROSION WOULD IMPACT WILDLIFE AND SENSITIVE WETLANDS
 - ▶ HAND-PULLING WOULD REQUIRE MUCH TIME AND LABOR.
- 

GOALS:



REMOVE THE BUCKTHORN USING THE NATURAL ROOTING ACTIVITY OF HOGS



PREVENT LEACHING OF HERBICIDES INTO SENSITIVE WETLANDS





**PRESERVE
THE
WINDBREAK
AND
PREVENT
SOIL
EROSION**

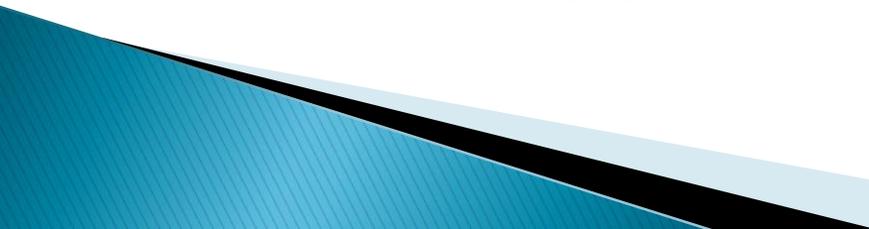
PUT PRESSURE ON BUCKTHORN SEEDLINGS BY GRAZING WITH SHEEP UNTIL THE SEEDBANK IS DEPLETED.



**THE LONG TERM GOAL IS TO
RETURN THE AREA TO NATIVE
PLANT AND TREE SPECIES.**



FARM GOALS:

- ▶ UTILIZE FOREST FORAGING AS A FOOD SOURCE FOR HOGS AND SHEEP.
 - ▶ REDUCE FEED COSTS BY USING GROCERY STORE WASTE FOOD.
 - ▶ RETAIN WINDBREAKS
 - ▶ PRODUCE QUALITY PORK AND LAMB.
 - ▶ USE SUSTAINABLE PRACTICES TO IMPROVE FARM SOIL, FORAGE QUALITY, AND LIVESTOCK HEALTH.
 - ▶ REMOVE BUCKTHORN PERMANANTLY
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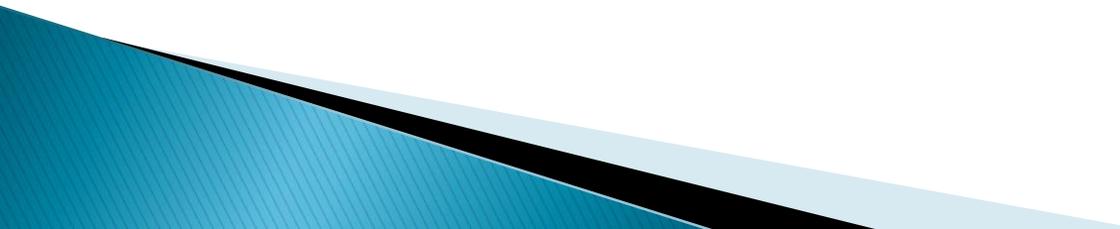
COMMUNITY GOALS

- ▶ PROTECT WILDLIFE AND AREA WETLANDS.
 - ▶ REDUCE LOCAL GROCERY STORE WASTE FROM REACHING AREA LANDFILLS.
 - ▶ RECYCLE PACKAGING FROM GROCERY PRODUCTS.
 - ▶ UTILIZE LOCAL FOOD RESOURCES FOR FEEDING LIVESTOCK.
 - ▶ SHARE BUCKTHORN CONTROL TECHNIQUES WITH FOREST AND LAND MANAGEMENT PROFESSIONALS.
 - ▶ COMPOST INEDIBLE FOOD WASTE.
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PART ONE: THE BEAUTY OF HOGS



WHAT A HOG CAN DO THAT MACHINERY CAN'T

- ▶ HOGS CAN WORK THE GROUND AROUND LARGE TREES AND BOULDERS WITHOUT DISTURBING DEEP ROOTED TREE SPECIES AND WITHOUT COMPACTING THE SOIL.
 - ▶ HOGS CAN WORK DAY AND NIGHT, THEY DON'T BURN FOSSIL FUELS, AND THEY DON'T REQUIRE PAY FOR LABOR.
 - ▶ HOGS CAN GLEAN UP TO 40% OF THEIR DIET FROM FOREST AND PASTURE FORAGE.
 - ▶ HOGS CAN DIG TOPSOIL AND REMOVE ROOTS AND STUMPS AND BREAK UP AND TRAMPLE BRUSHY DEBRIS.
- 

THE AREA IN THE FOREGROUND WAS HOGGED OFF AND SEEDED.



THE BUCKTHORN IN THE BACKGROUND IS PART OF THE TEN ACRE TARGET AREA



HOW TO REMOVE BUCKTHORN USING HOGS



TRAIN THE HOGS TO JUMP BACK WHEN THEY TOUCH A FENCE BY PUTTING A HOT ELECTRIC WIRE INSIDE A PERMANENT FENCE.



SET UP THE HOG HOUSES, FEEDERS AND WATER.



FENCE THE AREA WITH PIG- QUIK ELECTRO-WEB FENCING



PIG-QUIK FENCE FROM PREMIER 1

- ▶ PIG QUIK ELECTROWEB FENCING AND A PARMAK BATTERY FENCER MOUNTED ON ITS OWN GROUND ROD WAS AN EXCELLENT SYSTEM.
- ▶ IT IS EASY TO INSTALL WITH ONE PERSON
- ▶ IT IS SHORT ENOUGH TO STEP OVER TO ACCESS HOG YARDS FOR FEEDING ETC.
- ▶ IT IS EASY TO FENCE IN ANY SHAPED AREA SO YOU CAN TARGET HEAVILY INFESTED AREAS WHILE LEAVING AREAS OF HEALTHY FOREST UNTOUCHED.
- ▶ CORNERS WERE BRACED BY TYING TO STEEL FENCE POSTS OR FIBERGLASS POSTS.

HOGS EAT ALMOST ANY VEGETATION AND WHAT THEY DON'T EAT THEY TRAMPLE.



**HOGS EAT WORMS, INSECTS, ROOTS,
MUSHROOMS, PLANTS, ACORNS,
FROGS AND SNAKES.**



THEY ACTIVELY SEARCH THE UNDERBRUSH FOR ANYTHING EDIBLE.



TOO MUCH OF A GOOD THING?

- ▶ HOGS CAN BE DETRIMENTAL TO A PASTURE BY ROOTING UP FAVORABLE FORAGE AND CREATING MUD WALLOWS.
 - ▶ MOVING HOGS FREQUENTLY CAN REDUCE DAMAGE TO FORAGE, REDUCE THE BUILD UP OF PARASITES IN THE SOIL, AND ALLOW THE FORAGE TO RECOVER.
 - ▶ FREQUENT MOVES ALSO PREVENTS THE BUILD UP OF HOG MANURE AND NUISANCE ODORS AND PROTECTS FROM GROUND WATER CONTAMINATION.
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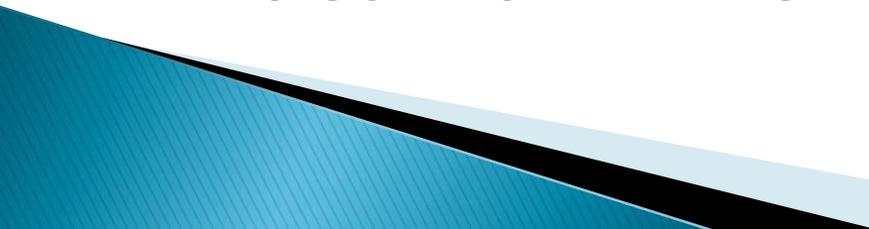
ONCE THE VEGETATION IS EATEN OR TRAMPLED THE HOGS ARE MOVED.



THE HOGS IMMEDIATELY BEGIN TO FORAGE IN THE NEW PASTURE.



LIMITATIONS OF BUCKTHORN REMOVAL USING HOGS

- ▶ HOGS WON'T DIG IN DUNGING AREAS
 - ▶ HOGS ARE LESS ACTIVE DURING HOT WEATHER
 - ▶ HOGS DIG LESS WHEN SOIL IS DRY
 - ▶ HOGS CHOOSE EASIEST AREAS TO DIG AND AVOID HARD TO DIG AREAS
 - ▶ HOGS WON'T DIG NEAR ELECTRIC FENCE
- 

MAKING THE MOST OF HOG POWERED BUCKTHORN REMOVAL



PLACE FEED TROUGHS IN BUCKTHORN THICKETS FOR MORE TRAMPLING



LARGER HOGS TRAMPLE AND MOVE MORE DIRT THAN SMALLER HOGS



SAVE THE THICKEST BUCKTHORN THICKETS FOR LARGER HOGS



THE FREE-RANGE CHICKENS KEPT THE HOG AREAS CLEANER.



A “PULLER BEAR” WEED WRENCH WAS USED TO PULL BUCKTHORN THE HOGS MISSED



THE DEBRIS IN THE HOGGED OFF AREAS SHOULD BE PICKED UP



IF BUCKTHORN ROOTS TOUCH SOIL THEY CAN GROW BACK



REMOVING DEBRIS ALSO HELPS IMPROVE SEED-TO-SOIL CONTACT



THE BARE SOIL IS PERFECT FOR BROADCAST SEEDING OF GRASS.



SOIL SAMPLES DETERMINED THAT THE SOIL WAS READY FOR PLANTING



MULTIPLE SAMPLES WERE TAKEN FROM THE TOP FOUR INCHES OF SOIL



THE SAMPLES WERE MIXED AND SENT TO THE UNIVERSITY OF MINNESOTA SOIL TESTING LABORATORY



SHADE SEED WAS BROADCAST BETWEEN THE TREES

- ▶ SHADE SEED MIX:
 - FINE FESCUES –
CREEPING, HARD AND CHEWINGS VARIETIES
 - KENTUCKY BLUE GRASS –
LIMOUSINE AND BARON VARIETIES.

OLD BEDDING WAS USED FOR MULCH TO KEEP SEEDS MOIST



**SINCE THE SUMMER AND FALL WERE
SO DRY, WE FROST SEEDED IN
MARCH 2012.**



FROST SEEDING IS TO BROADCAST SEED ONTO SNOWPACK IN LATE SPRING



THE FREEZING AND THAWING CONDITIONS OF SPRING



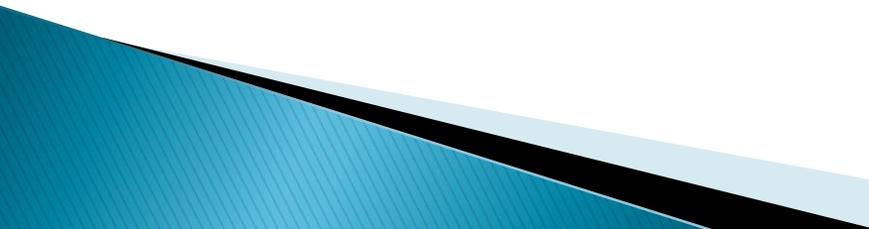
**CAUSE CRACKS TO OPEN IN THE
GROUND WHERE SEEDS SETTLE AND
GET GOOD SEED TO SOIL CONTACT.**



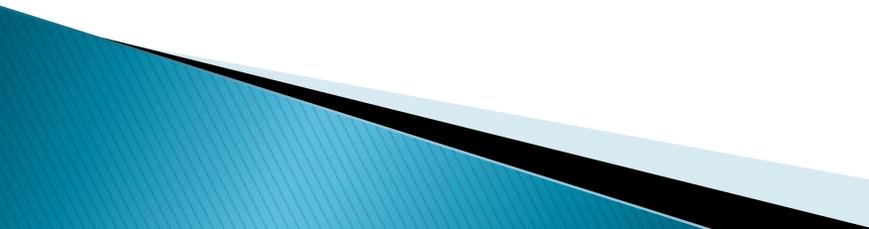
THE FROST SEEDED AREAS GOT AN EARLY START AND WERE ABLE TO BE GRAZED IN EARLY FALL.



THE HIGH COST OF CORN AND SOYBEANS

- ▶ GLOBAL DEMAND AND COMMODITIES SPECULATORS HAVE CAUSED CORN AND SOYBEAN PRICES TO RISE.
 - ▶ DEMAND FOR CORN TO MAKE ETHANOL HAS PUT FURTHER PRESSURE ON CORN SUPPLIES.
 - ▶ THE DROUGHT OF 2012 HAD INCREASED THE COST OF GRAIN AND HAY.
 - ▶ CORN AND SOYBEAN FIELDS ARE THE BIGGEST SOURCES OF SOIL EROSION AND HERBICIDE AND PESTICIDE RUN-OFF.
 - ▶ HIGH PRICES AND HIGH COST TO THE ENVIRONMENT ARE MAKING ALTERNATIVE FOODS MORE REALISTIC AS HOG RATIONS.
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FORTY PERCENT OF ALL FOOD PRODUCED IS WASTED

- ▶ ALL FOOD PRODUCTS HAVE A DATED SHELF LIFE.
 - ▶ IMPERFECT PRODUCE WITH ODD-SHAPES OR COLORS, OR PRODUCE WITH NICKS OR BRUISES ARE CULLED.
 - ▶ SOME IS LEFT IN THE FIELDS. SOME IS NEVER SHIPPED.
 - ▶ THE FOOD THAT MAKES IT TO THE SUPERMARKET IS PICKED OVER FOR IMPERFECTIONS, NICKS OR BLEMISHES, AND FINALLY BECOMING OVERRIPE.
 - ▶ NINETY PERCENT OF THE CULLED PRODUCE IS EDIBLE BUT FOOD SAFETY LAWS PROHIBIT USE BY HUMANS.
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REDUCING GROCERY STORE WASTE

- ▶ TEAL'S MARKET IN MILACA, MN GENEROUSLY PARTICIPATED IN THIS RESEARCH.
 - ▶ THEY PROVIDED PRODUCE AND DAIRY PRODUCTS THAT WERE PAST THEIR "BEST IF USED BY DATE," OR PAST FRESH.
 - ▶ BETWEEN JUNE 27, 2011 AND NOVEMBER 27, 2012, WE COLLECTED 50,867 POUNDS OF FOOD AND PACKAGING AND KEPT IT FROM THE AREA LANDFILL.
 - ▶ AN AVERAGE OF 200 POUNDS OF FOOD WAS COLLECTED DAILY.
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GROCERY STORE FOOD WAS PICKED UP SIX DAYS A WEEK



FRUITS AND VEGETABLES MADE UP ABOUT HALF OF THE FOOD



DAIRY PRODUCTS MADE UP THE REST OF THE FOOD



THE TYPE OF FOOD VARIED ACCORDING TO WHAT WAS IN SEASON



MOST OF THE FOOD WAS FED STRAIGHT OUT OF THE PACKAGE



UNPACKAGING FOOD TOOK SEVERAL HOURS A DAY



ROTTEN OR MOLDY FOOD WAS COMPOSTED



PACKAGING WAS SORTED, RINSED, STACKED AND STORED FOR RECYCLING



FOOD WAS REFRIGERATED



OR FROZEN



OR FED FRESH



RECYCLING WAS TAKEN TO TOWN ONCE A MONTH



WE RAISED TWELVE HOGS AND 100 CHICKENS ON 50,000 POUNDS OF GROCERY STORE WASTE



PART THREE: PREVENTING BUCKTHORN FROM RETURNING



PRESSURE BY GRAZING SHEEP WILL PREVENT BUCKTHORN SEEDLINGS FROM GETTING RE-ESTABLISHED.



**HAIR SHEEP WERE CHOSEN
BECAUSE THEY BOTH GRAZE ON
GRASS AND BROWSE ON BRUSH**



**HAIR SHEEP DON'T REQUIRE SHEARING,
DE-HORNING OR TAIL DOCKING.**



THEY EAT BUCKTHORN AND MOST OTHER PLANTS



SHADE GRASS VARIETIES ARE SHADE TOLERANT



**BUT SHADE GRASS WILL PRODUCE
MORE FORAGE IF IT RECEIVES
MORE LIGHT**



DECAYED OR DAMAGED TREES WERE REMOVED TO OPEN THE CANOPY



REMOVAL OF OLDER TREES ALLOWS YOUNGER TREES TO GROW



THE CULLED TREES WILL BE USED AS FIREWOOD



GRASS IS ALLOWED TO GROW SIX INCHES TALL BEFORE GRAZING



SHEEP ARE REMOVED WHEN GRASS GETS SHORTER THAN THREE INCHES



AREAS NOT HOGGED OFF WILL BE GRAZED BY SHEEP TO SEE THEIR IMPACT ON BUCKTHORN



WOODLAND PLANTS ARE A VIABLE FEED SOURCE FOR SHEEP



PARASITE INFESTATION OCCURS WHEN SHEEP GRAZE THE SAME AREAS ALL SEASON LONG



ROTATING SHEEP TO NEW PASTURES WILL BREAK THE PARASITE CYCLE



ROTATING WITH OTHER SPECIES WILL REDUCE SPECIES SPECIFIC PARASITES



TRADITIONAL PARASITE MANAGEMENT INVOLVES PERIODIC WORMING SCHEDULES



FECAL EGG COUNT

- ▶ FECAL EGG COUNTS CAN DETERMINE AMOUNT OF PARASITE INFESTATION
- ▶ THESE SHEEP HAD A MILD INFESTATION AND WERE WORMED TO PREPARE FOR BREEDING.
- ▶ A RE-CHECK WAS DONE 3 WEEKS BEFORE LAMBING AND NO PARASITE EGGS WERE FOUND AND NO WORMING WAS NEEDED
- ▶ FECAL TESTING HAS ALREADY REDUCED THE USE OF WORMERS ON THIS FARM
- ▶ REDUCED USE OF WORMERS WILL PREVENT PARASITE RESISTENCE TO WORMING AGENTS

SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION

- ▶ A SPECIAL THANKS TO SARE FOR MAKING THIS PROJECT POSSIBLE
 - ▶ AND A SPECIAL THANKS TO TONY MILLER, OF THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES FORESTRY DIVISION, MORRIS MINNESOTA WHO OVERSAW THIS PROJECT FROM ITS ONSET IN 2010.
 - ▶ AND A SPECIAL THANKS TO NATE TEIG OF AMERY, WISCONSIN WHO HAS BEEN A GREAT RESOURCE FOR THE MANAGEMENT OF THE HAIR SHEEP.
 - ▶ AND A SPECIAL THANK YOU TO SCOTT WAGNER WHO WORKED ON EVERY ASPECT OF THIS PROJECT TO MAKE IT A SUCCESS.
- 