**NATURAL RESOURCES CONSERVATION SERVICE**
**MONTANA CONSERVATION PRACTICE JOB SHEET**

# WASTE UTILIZATION (ACRE)

## CODE 633

## MANURE NITROGEN CREDITING

**PRODUCER** _____ **PLANNING DATE** _____

ANIMAL (SPECIES) _____ _____ _____

FORM (LIQUID OR SOLID) _____ _____ _____

## NITROGEN

**TOTAL AVAILABLE NITROGEN IN MANURE**
**(lbs. N/1,000 gal or lbs. N/ton)**

ANALYSIS SOURCE: ESTIMATING MANURE N___ MANURE TEST___

1ST YEAR AFTER APPLICATION [1] _____ _____ _____(a)

2ND YEAR AFTER APPLICATION [1] _____ _____ _____(a)

3RD YEAR AFTER APPLICATION [1] _____ _____ _____(a)

**APPLICATION RATE (1,000 gal/ac. or tons/ac.)** [2]

1ST YEAR _____ _____ _____(b)

2ND YEAR _____ _____ _____(b)

3RD YEAR _____ _____ _____(b)

**NITROGEN APPLIED (lbs./ac) = (a) x (b)**

_____ CROP YEAR (1ST YEAR) [3] _____ _____ _____

_____ CROP YEAR (2ND YEAR) _____ _____ _____

_____ CROP YEAR (3RD YEAR) _____ _____ _____

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[1] From "Estimating Manure Nitrogen," line 8, or "Manure Test Nitrogen," line 7.

[2] Manure application should be scheduled to meet plant needs using Nutrient Management Job Sheet (590).

[3] Indicate crop year when nutrients will be available. lbs./ac transfers to Nutrient Management Job Sheet (590).

**TABLE 1. Nitrogen Availability and Loss as Affected by Method of Application**

| BROADCAST – INCORPORATE [1] | | | INJECTION | | SPRINKLE |
|---|---|---|---|---|---|
| <12 hrs. | <4 days | >4 days | Sweep | Knife | |
| % Total N | | | | | |
| 70 | 60 | 50 | 90 | 95 | 75 |

[1] Categories refer to the length of time between manure application and incorporation

## PHOSPHORUS and POTASSIUM

Pounds per acre $P_2O_5$ and $K_2O$ available to crops in the 1st year are found by multiplying $P_2O_5$ or $K_2O$ in manure (from analysis or TABLE 2) times the selected application rate times 80% and 90%, respectively. **No 2nd or 3rd year credits are given.**

**If a manure analysis was obtained, list total phosphorus and total potassium, as received (pounds/ton or pounds/1,000 gal.). Attach manure analysis.**
***Be sure to enter elemental values only from manure analysis, i.e., P and K—not $K_2O$ or $P_2O_5$.***

**TOTAL P** = _____ lbs. **TOTAL K** = _____ lbs.

**FORM:** **Liquid** _____ **Solid** _____

**From manure analysis, calculate lbs./ac. of $P_2O_5$ and $K_2O$ applied:**

| | | | | (1,000 GAL./AC. OR TONS/AC.) | | | | (LBS./AC.) |
|---|---|---|---|---|---|---|---|---|
| _____ | X | 2.3 | X | _____ | X | 0.8 | = | _____ |
| | | P–$P_2O_5$ Conv. | | APPLICATION RATE | | | | $P_2O_5$ |
| _____ | X | 1.2 | X | _____ | X | 0.9 | = | _____ |
| | | K–$K_2O$ Conv. | | APPLICATION RATE | | | | $K_2O$ |

**If manure analysis is not available, determine of $P_2O_5$ and $K_2O$ produced from TABLE 2 or from:**

Has manure been separated? ☐ YES ☐ NO Applied Form? ☐ LIQUID ☐ SOLID

| | | | | | | | | | ADJUSTMENT FOR SEPARATION |
|---|---|---|---|---|---|---|---|---|---|
| _____ | / | _____ | X | _____ | X | 2.3 | = | _____ | _____ |
| P lbs./day | | Cu. Ft./Day. | | Cu. Ft./Ton* | | P–$P_2O_5$ Conv. | | $P_2O_5$ lbs./ton or 1,000 Gallons | |
| _____ | / | _____ | X | _____ | X | 1.2 | = | _____ | _____ |
| K lbs./day | | Cu. Ft./Day. | | Cu. Ft./Ton* | | K–$K_2O$ Conv. | | $K_2O$ lbs./ton or 1,000 Gallons | |

* Average volumetric weight for all animals.

**Calculate lbs./ac. of $P_2O_5$ and $K_2O$ applied:**

| (LBS./1,000 GAL. OR LBS./TON) | | | (1,000 GAL./AC. OR TONS/AC.) | | | | (LBS./AC.) |
|---|---|---|---|---|---|---|---|
| _____ | X | Application Rate | _____ | X | 0.8 | = | _____ |
| $P_2O_5$ Manure | | | | | | | $P_2O_5$ |
| _____ | X | Application Rate | _____ | X | 0.9 | = | _____ |
| $K_2O$ Manure | | | | | | | $K_2O$ |

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## ESTIMATING MANURE NITROGEN

**1. Is this a beef open feedlot management system?** ☐ YES ☐ NO

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $N_{excr}$ | = | | X | | X | | = | | TOTAL LBS. N |
| | $N_{excr}$ | = | | X | | X | | = | | |
| | $N_{excr}$ | = | | X | | X | | = | | |
| ANIMAL TYPE | | | NO. OF ANIMALS | | DAYS | | LBS. N/DAY | | LBS. N | |

**Are liquids and solids separated?** ☐ YES ☐ NO **Manure Form** ☐ SOLID ☐ LIQUID

**Pounds N based on Separated Manure Forms**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | SOLIDS | | LIQUIDS | |
| $N_{excr}$ | = | | X | | = | LBS. N | | LBS. N |

**2. Estimate portion of nitrogen retained after storage and treatment using TABLE 3.** $N_{retain}$

Manure Management System: _____

**3. Estimate inorganic nitrogen converted from manure nitrogen (mineralization) and becoming available after application using TABLE 4.**

$N_{conv}$ 1st year = $N_{conv}$ 2nd year = $N_{conv}$ 3rd year =

**4. Estimate portion of nitrogen remaining after denitrification using TABLE 5.**

$N_{deni}$ 1st year = $N_{deni}$ 2nd year = $N_{deni}$ 3rd year =

**5. Estimate portion of nitrogen remaining due to application of manure using TABLE 1** **$N_{appl}$ 1st year =**
***(No application reduction is taken second or third years when manure is applied first year only).***

**Application Method:** _____ **Time (IF APPLICABLE):** _____ HOURS / DAYS

**6. Calculate nitrogen ($N0_3$) available for plant uptake for each year.**

| $N_{excr}$ | X | $N_{retain}$ | X | $N_{conv}$ 1st yr. | X | $N_{deni}$ 1st yr. | X | $N_{appl}$ 1st yr. | = | $N_{avail}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | X | | X | | X | | X | | = | | LBS. N 1ST YEAR |
| | X | | X | | X | | X | | = | | LBS. N 2ND YEAR |
| | X | | X | | X | | X | | = | | LBS. N 3RD YEAR |

**7. Compute total pounds of manure produced, as excreted. (Use TABLE 2)**

**Solid Form** (USE FOR COMBINED SLURRY/SEMI-SOLID FORMS AND SEPARATED SOLID FORM)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X | | X | | / 32 | = | | Tons of Manure |
| | X | | X | | / 32 | = | | Tons of Manure |
| | X | | X | | / 32 | = | | Tons of Manure |
| NO. OF ANIMALS | | DAYS | | CU. FT./DAY | CU. FT./TON* | | | |

**Liquid Form** (USE FOR SEPARATED LIQUID FORM ONLY)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X | | X | | / 7.48 | = | | 1,000 Gallons of Manure |
| | X | | X | | / 7.48 | = | | 1,000 Gallons of Manure |
| | X | | X | | / 7.48 | = | | 1,000 Gallons of Manure |
| NO. OF ANIMALS | | DAYS | | CU. FT./DAY | GAL./CU. FT.* | | | |

- Average volumetric weight for all animals.

**8. Calculate total pounds of available nitrogen per ton of manure produced.**

| #AVAIL. N 1ST YR | / | TONS OR GALS. | = | | Lbs. Available N/ton or N/1,000 Gal. |
|---|---|---|---|---|---|
| #AVAIL. N 2ND YR | / | TONS OR GALS. | = | | Lbs. Available N/ton or N/1,000 Gal. |
| | / | | = | | Lbs. Available N/ton or N/1,000 Gal. |

# ESTIMATING BEEF FEEDLOT MANURE PRODUCTION

| ANIMAL TYPE COW, FEEDER, BULL, CALF, HEIFER | NUMBER OF ANIMALS | AVERAGE WEIGHT | NUMBER OF DAYS IN LOT/YEAR | N LBS/DAY/1,000# | P LBS/DAY/1,000# | K LBS/DAY/1,000# |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| ANIMAL TYPE COW, FEEDER, BULL, CALF, HEIFER | EXCRETED VOLUME (CU. FT./DAY) | TOTAL N (LBS./YR) | TOTAL P (LBS./YR) | TOTAL K (LBS./YR) | TOTAL SOLIDS (CU. FT./YR.) | TOTAL SOLIDS (TONS/YR.) |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| TOTAL | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X | 2.3 | | X | 0.8 | = | | |
| LBS P/TON | | P–$P_2O_5$ Conv. | TONS/AC. Application Rate | | | | (LBS./AC.) $P_2O_5$ | |
| | X | 1.2 | | X | 0.9 | = | | |
| LBS K/TON | | K–$K_2O$ Conv. | TONS/AC. Application Rate | | | | (LBS./AC.) $K_2O$ | |

## CERTIFICATION:

I hereby certify that this practice has been installed in accordance with NRCS standards and specifications.

NRCS Conservationist _____ JOB APPROVAL AUTHORITY _____ Date _____

Producer _____ Date _____

NO INFORMATION ON THIS PAGE.

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## MANURE TEST NITROGEN

**DATE:** _____

**1. From manure analysis, list total nitrogen, as received, (pounds/ton or pounds/1,000 gal.).** ***Attach manure analysis.***

☐ LIQUID ☐ SOLID TOTAL N = [ ] LBS.

**2. Estimate inorganic nitrogen converted from manure nitrogen (mineralization) and becoming available after application using TABLE 4.**

$N_{conv}$ 1st year = [ ] $N_{conv}$ 2nd year = [ ] $N_{conv}$ 3rd year = [ ]

**3. Estimate portion of nitrogen remaining after denitrification using TABLE 5.**

$N_{deni}$ 1st year = [ ] $N_{deni}$ 2nd year = [ ] $N_{deni}$ 3rd year = [ ]

**4. Estimate portion of nitrogen remaining due to application of manure using TABLE 1. $N_{appl}$ 1st year =** [ ]
***(No application reduction is taken second or third years when manure is applied first year only).***

Application Method: _____ Time (IF APPLICABLE): _____ HOURS OR DAYS

**5. Calculate nitrogen ($N0_3$) available for plant uptake for each year.**

| $N_{test}$ | X | $N_{conv}$ 1st yr. | X | $N_{deni}$ 1st yr. | X | $N_{appl}$ 1st yr. | = | $N_{avail}$ | |
|---|---|---|---|---|---|---|---|---|---|
| | X | | X | | X | | = | | LBS. N 1ST YEAR |
| | X | | X | | X | | = | | LBS. N 1ST YEAR |
| | X | | X | | X | | = | | LBS. N 1ST YEAR |

**6. Compute total pounds of manure produced, as excreted. (Use TABLE 2)** ***Multiple animal types can be entered.***

**Is this a beef open feedlot management system?** ☐ YES ☐ NO

Complete for Solid Form Analysis:

| NO. OF ANIMALS | | DAYS | | CU. FT./DAY | | CU. FT./TON* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | X | | X | | / | 32 | = | | TONS OF MANURE |
| | X | | X | | / | 32 | = | | TONS OF MANURE |
| | X | | X | | / | 32 | = | | TONS OF MANURE |

Complete for Liquid Form Analysis:

| NO. OF ANIMALS | | DAYS | | CU. FT./DAY | | GAL./CU. FT.* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | X | | X | | / | 7.48 | = | | 1,000 GALLONS OF MANURE |
| | X | | X | | / | 7.48 | = | | 1,000 GALLONS OF MANURE |
| | X | | X | | / | 7.48 | = | | 1,000 GALLONS OF MANURE |

**MT633-JS8**

**7. Calculate total pounds of available nitrogen per ton of manure produced.**

| | | | | | |
|---|---|---|---|---|---|
| | / | | = | | **LBS. AVAILABLE N/TON OR N/1,000 GALLONS** |
| #AVAIL. N 1ST YR. | | TONS OR GALS. | | | |
| | / | | = | | **LBS. AVAILABLE N/TON OR N/1,000 GALLONS** |
| #AVAIL. N 2ND YR. | | TONS OR GALS. | | | |
| | / | | = | | **LBS. AVAILABLE N/TON OR N/1,000 GALLONS** |
| #AVAIL. N 3RD YR. | | TONS OR GALS. | | | |

- Average volumetric weight for all animals.

## CERTIFICATION:

I hereby certify that this practice has been installed in accordance with NRCS standards and specifications.

NRCS Conservationist | JOB APPROVAL AUTHORITY | Date

Producer | Date

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**TABLE 2. Daily Manure Production (AS EXCRETED)**

| ANIMAL | SIZE LBS. | PRODUCTION CU. FT./DAY | PERCENT WATER | NUTRIENT CONTENT | | |
|---|---|---|---|---|---|---|
| | | | | N LBS. / DAY | P LBS. / DAY | K LBS. / DAY |
| **Dairy Cow** | 150 | 0.190 | 87 | 0.060 | 0.01000 | 0.04000 |
| | 250 | 0.320 | 87 | 0.100 | 0.02000 | 0.07000 |
| | 500 | 0.660 | 87 | 0.200 | 0.03600 | 0.14000 |
| | 1000 | 1.300 | 87 | 0.410 | 0.07300 | 0.27000 |
| | 1400 | 1.850 | 87 | 0.570 | 0.10200 | 0.38000 |
| **Beef** | <750 | 0.930 | 88 | 0.300 | 0.10000 | 0.20000 |
| | 1000 | 0.950 | 88 | 0.310 | 0.11000 | 0.24000 |
| | 1250 | 1.000 | 88 | 0.330 | 0.12000 | 0.26000 |
| **Swine** | | | | | | |
| Nursey | 35 | 0.038 | 90 | 0.016 | 0.00520 | 0.01000 |
| Growing | 65 | 0.070 | 90 | 0.029 | 0.00980 | 0.02000 |
| Finish | 150 | 0.160 | 90 | 0.068 | 0.02200 | 0.04500 |
| | 200 | 0.220 | 90 | 0.090 | 0.03000 | 0.05900 |
| Gestate | 275 | 0.150 | 90 | 0.062 | 0.02100 | 0.04000 |
| Sow & litter | 375 | 0.540 | 90 | 0.230 | 0.07600 | 0.15000 |
| Boar | 350 | 0.190 | 90 | 0.078 | 0.02600 | 0.05100 |
| **Poultry** | | | | | | |
| Layers | 4 | 0.0035 | 75 | 0.0029 | 0.00110 | 0.00120 |
| Broilers | 2 | 0.0024 | 75 | 0.0024 | 0.00054 | 0.00075 |
| Turkey | 10 | 0.0069 | 75 | 0.0074 | 0.00280 | 0.00280 |

**TABLE 3. Nitrogen Remaining After Storage, Treatment, and Application**

| MANURE MANAGEMENT SYSTEM | PORTION REMAINING (%) |
|---|---|
| Oxidation ditch, effluent storage | 20 to 30 |
| Anaerobic lagoon or storage pond after 50% dilution | 10 to 30 |
| Open lot surface storage | 40 to 60 |
| Aerobic lagoon | 45 to 55 |
| Roofed storage or manure pack | 60 to 75 |
| Shallow, open, manure storage pond | 70 to 80 |
| Stacking facility | 65 to 75 |
| Deep, open, manure storage pond | 70 to 80 |
| Liquid manure tank, covered | 80 to 90 |

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**TABLE 4. Organic Waste Decay Rate (MINERALIZATION—SOIL-INCORPORATED "N" CONVERTED TO INORGANIC "N") ***

| TYPE OF WASTE | 1ST YEAR AFTER APPLICATION % AVAILABLE | 2ND YEAR AFTER APPLICATION % AVAILABLE | 3RD YEAR AFTER APPLICATION % AVAILABLE |
|---|---|---|---|
| Fresh poultry manure | 90 | 2 | 1 |
| Fresh swine manure | 75 | 4 | 2 |
| Fresh cattle manure | 70 | 4 | 2 |
| Fresh sheep and horse manure | 60 | 6 | 2 |
| Liquid manure, covered tank | 65 | 5 | 3 |
| Liquid manure, storage pond | 65 | 5 | 3 |
| Solid manure, stack | 60 | 6 | 2 |
| Solid manure, open pit | 55 | 5 | 2 |
| Manure pack, roofed | 50 | 5 | 2 |
| Manure pack, open feedlot | 45 | 5 | 3 |
| Storage pond effluent | 40 | 6 | 3 |
| Oxidation ditch effluent | 40 | 6 | 3 |
| Aerobic lagoon effluent | 40 | 6 | 3 |
| Anaerobic lagoon effluent | 30 | 6 | 3 |
| Digested sewage sludge | 35 | 5 | 2 |

* If irrigated, reduce 1st year mineralization by 5%.

**TABLE 5. Nitrogen Remaining After Denitrification**

| SOIL DRAINAGE CLASS | REMAINING INORGANIC "N" % |
|---|---|
| Excessively or somewhat excessively drained | 97 |
| Well drained | 90 |
| Moderately well drained | 85 |
| Somewhat poorly drained | 80 |
| Poorly drained | 70 |
| Very poorly drained | 60 |