

Appendix G: Runoff concentration in and mass loss via runoff of phosphorus tables

Table G-1: Ortho-P mass loss means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| Ortho-P | | Mass Response |
|------------------|-----------------|---------------|
| Forage Treatment | <i>p</i> -value | Mass, kg/ha |
| B | 0.3907 | 0.0942 |
| O | | 0.0700 |
| Manure Treatment | | |
| C | 0.2656 | 0.0880 |
| H | | 0.0660 |
| L | | 0.1029 |
| Forage x Manure | | |
| CB | 0.0941 | 0.1244 |
| CO | | 0.0528 |
| HB | | 0.0729 |
| HO | | 0.0606 |
| LB | | 0.0854 |
| LO | | 0.1205 |

* Treatment letters: B- Broadleaf, O- Orchardgrass, C-Control manure, H-High manure, L- Low manure.

**Pairing of treatment letters indicates a treatment combination.

Table G-2: Ortho-P mass loss means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| Ortho-P | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|--------|--------|--------|--------|--------|
| Mass Response | Mass, kg/ha | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | <i>p</i> = 0.4792 | | | | | |
| B | 0.0715 | 0.0692 | 0.7747 | 0.1263 | 0.1592 | 0.0619 |
| O | 0.0679 | 0.0515 | 0.1285 | 0.0737 | 0.1041 | 0.0422 |
| Manure x Time | <i>p</i> = 0.9301 | | | | | |
| C | 0.0895 | 0.0543 | 0.0831 | 0.1251 | 0.1205 | 0.0592 |
| H | 0.0562 | 0.0462 | 0.0638 | 0.0719 | 0.1265 | 0.0363 |
| L | 0.0635 | 0.0804 | 0.1620 | 0.1031 | 0.1480 | 0.0607 |
| Forage x Manure x Time | <i>p</i> = 0.9011 | | | | | |
| CB | 0.0960 | 0.0925 | 0.1140 | 0.1827 | 0.1909 | 0.0699 |
| CO | 0.0820 | 0.0160 | 0.0522 | 0.0670 | 0.0500 | 0.0480 |
| HB | 0.0480 | 0.0560 | 0.0450 | 0.0940 | 0.1448 | 0.0480 |
| HO | 0.0640 | 0.0360 | 0.0819 | 0.0491 | 0.1081 | 0.0245 |
| LB | 0.0699 | 0.0585 | 0.0727 | 0.1015 | 0.1420 | 0.0670 |
| LO | 0.0570 | 0.1023 | 0.2513 | 0.1046 | 0.1540 | 0.0537 |

Table G-3: Ortho-P concentration loss means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| Ortho-P | | Concentration Response |
|------------------|-----------------|------------------------|
| Forage Treatment | <i>p</i> -value | Concentration, ppm |
| B | 0.1788 | 1.18 |
| O | | 0.99 |
| Manure Treatment | | Concentration, ppm |
| C | 0.6119 | 1.12 |
| H | | 1.00 |
| L | | 1.13 |
| Forage x Manure | | Concentration, ppm |
| CB | 0.1479 | 1.31 |
| CO | | 0.93 |
| HB | | 1.18 |
| HO | | 0.82 |
| LB | | 1.04 |
| LO | | 1.21 |

Table G-4: Ortho-P concentration loss means and *p* values for forage and manure treatments and forage x manure treatment time interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| Ortho-P | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|------|------|------|------|------|
| Concentration Response | Concentration, ppm | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | <i>p</i> = 0.1051 | | | | | |
| B | 0.66 | 0.85 | 1.09 | 1.37 | 1.76 | 1.34 |
| O | 0.74 | 0.63 | 1.56 | 0.87 | 1.34 | 0.79 |
| Manure x Time | <i>p</i> = 0.9278 | | | | | |
| C | 0.87 | 0.77 | 1.21 | 1.23 | 1.39 | 1.25 |
| H | 0.59 | 0.70 | 1.17 | 0.99 | 1.57 | 0.98 |
| L | 0.63 | 0.74 | 1.59 | 1.14 | 1.69 | 0.97 |
| Forage x Manure x Time | <i>p</i> = 0.8696 | | | | | |
| CB | 0.80 | 0.87 | 1.39 | 1.45 | 1.70 | 1.58 |
| CO | 0.94 | 0.68 | 1.02 | 0.96 | 1.07 | 0.92 |
| HB | 0.62 | 0.91 | 0.98 | 1.35 | 1.92 | 1.33 |
| HO | 0.57 | 0.50 | 1.36 | 0.64 | 1.22 | 0.64 |
| LB | 0.70 | 0.71 | 2.29 | 1.00 | 1.73 | 0.82 |
| LO | 0.74 | 0.74 | 2.32 | 1.04 | 1.77 | 0.86 |

Table G-5: PP mass loss means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| PP | Mass Response | |
|------------------|-----------------|-------------|
| Forage Treatment | <i>p</i> -value | Mass, kg/ha |
| B | 0.4007 | 0.0279 |
| O | | 0.0363 |
| Manure Treatment | | |
| C | 0.05 | 0.0227 |
| H | | 0.0515 |
| L | | 0.0222 |
| Forage x Manure | | |
| CB | 0.4185 | 0.0195 |
| CO | | 0.0259 |
| HB | | 0.0395 |
| HO | | 0.0636 |
| LB | | 0.0249 |
| LO | | 0.0195 |

Table G-6: PP mass loss means and *p* values for forage and manure treatments and forage x manure treatment time interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| PP | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|--------|--------|--------|--------|--------|
| Mass Response | Mass, kg/ha | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | <i>p</i> = 0.4185 | | | | | |
| B | 0.1106 | 0.0075 | 0.0204 | 0.0112 | 0.0171 | 0.0009 |
| O | 0.1569 | 0.0232 | 0.0091 | 0.0049 | 0.0228 | 0.0008 |
| Manure x Time | <i>p</i> < 0.0001 | | | | | |
| C | 0.0601 | 0.0121 | 0.0182 | 0.0062 | 0.0392 | 0.0002 |
| H | 0.2641 | 0.0143 | 0.0039 | 0.0127 | 0.0124 | 0.0015 |
| L | 0.0769 | 0.0197 | 0.0222 | 0.0051 | 0.0083 | 0.0008 |
| Forage x Manure x Time | <i>p</i> = 0.0847 | | | | | |
| CB | 0.0313 | 0.0200 | 0.0318 | 0.0020 | 0.0316 | 0.0000 |
| CO | 0.0888 | 0.0041 | 0.0047 | 0.0104 | 0.0468 | 0.0004 |
| HB | 0.1883 | 0.0006 | 0.0058 | 0.0211 | 0.0198 | 0.0010 |
| HO | 0.3399 | 0.0280 | 0.0020 | 0.0043 | 0.0050 | 0.0020 |
| LB | 0.1120 | 0.0020 | 0.0236 | 0.0102 | 0.0000 | 0.0016 |
| LO | 0.0418 | 0.0375 | 0.0207 | 0.0000 | 0.0167 | 0.0000 |

Table G-7: PP concentration loss means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| PP | | Concentration Response |
|------------------|-----------------|------------------------|
| Forage Treatment | <i>p</i> -value | Concentration, ppm |
| B | 0.2356 | 0.30 |
| O | | 0.38 |
| Manure Treatment | | |
| C | 0.0084 | 0.27 |
| H | | 0.52 |
| L | | 0.23 |
| Forage x Manure | | |
| CB | 0.3278 | 0.20 |
| CO | | 0.35 |
| HB | | 0.45 |
| HO | | 0.58 |
| LB | | 0.26 |
| LO | | 0.21 |

Table G-8: PP concentration loss means and *p* values for forage and manure treatments and forage x manure treatment time interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| PP | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|------|------|------|------|------|
| Concentration Response | Concentration, ppm | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | <i>p</i> = 0.3036 | | | | | |
| B | 1.17 | 0.09 | 0.28 | 0.10 | 0.16 | 0.02 |
| O | 1.45 | 0.28 | 0.17 | 0.05 | 0.29 | 0.04 |
| Manure x Time | <i>p</i> < 0.0001 | | | | | |
| C | 0.63 | 0.21 | 0.30 | 0.06 | 0.43 | 0.02 |
| H | 2.49 | 0.20 | 0.05 | 0.13 | 0.17 | 0.05 |
| L | 0.81 | 0.15 | 0.33 | 0.03 | 0.08 | 0.01 |
| Forage x Manure x Time | <i>p</i> = 0.0332 | | | | | |
| CB | 0.33 | 0.25 | 0.40 | 0.00 | 0.24 | 0.00 |
| CO | 0.93 | 0.17 | 0.19 | 0.12 | 0.63 | 0.06 |
| HB | 2.13 | 0.01 | 0.07 | 0.23 | 0.26 | 0.04 |
| HO | 2.85 | 0.39 | 0.04 | 0.03 | 0.09 | 0.06 |
| LB | 1.06 | 0.02 | 0.37 | 0.07 | 0.00 | 0.02 |
| LO | 0.56 | 0.27 | 0.30 | 0.00 | 0.16 | 0.00 |

Table G-9: TP mass loss means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TP | | Mass Response |
|------------------|-----------------|---------------|
| Forage Treatment | <i>p</i> -value | Mass, kg/ha |
| B | 0.7455 | 0.1197 |
| O | | 0.1126 |
| Manure Treatment | | |
| C | 0.8625 | 0.1090 |
| H | | 0.1172 |
| L | | 0.1223 |
| Forage x Manure | | |
| CB | 0.2304 | 0.1397 |
| CO | | 0.0782 |
| HB | | 0.1108 |
| HO | | 0.1236 |
| LB | | 0.1087 |
| LO | | 0.1360 |

Table G-10: TP mass loss means and *p* values for forage and manure treatments and forage x manure treatment time interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TP | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|--------|----------------------|--------|--------|--------|
| Mass Response | Mass, kg/ha | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | | | <i>p</i> = 0.5583 | | | |
| B | 0.1772 | 0.0764 | 0.0977 | 0.1324 | 0.1744 | 0.0603 |
| O | 0.2247 | 0.0747 | 0.1375 | 0.0744 | 0.1255 | 0.0388 |
| Manure x Time | | | <i>p</i> = 0.1273 | | | |
| C | 0.1421 | 0.0664 | 0.1014 | 0.1275 | 0.1597 | 0.0567 |
| H | 0.3203 | 0.0601 | 0.0672 | 0.0820 | 0.1385 | 0.0351 |
| L | 0.1404 | 0.1002 | 0.0184 | 0.1007 | 0.1517 | 0.0569 |
| Forage x Manure x Time | | | <i>p</i> = 0.4861 | | | |
| CB | 0.113 | 0.113 | 0.146 | 0.178 | 0.223 | 0.067 |
| CO | 0.171 | 0.020 | 0.057 | 0.077 | 0.097 | 0.047 |
| HB | 0.237 | 0.056 | 0.051 | 0.111 | 0.165 | 0.046 |
| HO | 0.404 | 0.064 | 0.084 | 0.053 | 0.112 | 0.025 |
| LB | 0.182 | 0.061 | 0.096 | 0.109 | 0.136 | 0.069 |
| LO | 0.099 | 0.140 | 0.272 | 0.093 | 0.167 | 0.045 |

Table G-11: TP concentration loss means and p values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TP | | Concentration Response |
|------------------|------------|------------------------|
| Forage Treatment | p -value | Concentration, ppm |
| B | 0.4501 | 1.45 |
| O | | 1.34 |
| Manure Treatment | | |
| C | 0.503 | 1.37 |
| H | | 1.50 |
| L | | 1.32 |
| Forage x Manure | | |
| CB | 0.4833 | 1.47 |
| CO | | 1.27 |
| HB | | 1.61 |
| HO | | 1.38 |
| LB | | 1.26 |
| LO | | 1.38 |

Table G-12: TP concentration loss means and p values for forage and manure treatments and forage x manure treatment time interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TP | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|------|------|------|------|------|
| Concentration Response | Concentration, ppm | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | $p = 0.1361$ | | | | | |
| B | 1.79 | 0.94 | 1.37 | 1.40 | 1.88 | 1.31 |
| O | 2.18 | 0.90 | 1.73 | 0.86 | 1.62 | 0.76 |
| Manure x Time | $p = 0.0084$ | | | | | |
| C | 1.44 | 0.98 | 1.50 | 1.24 | 1.82 | 1.23 |
| H | 3.08 | 0.90 | 1.23 | 1.07 | 1.73 | 0.97 |
| L | 1.44 | 0.89 | 1.92 | 1.07 | 1.69 | 0.90 |
| Forage x Manure x Time | $p = 0.3143$ | | | | | |
| CB | 1.01 | 1.12 | 1.79 | 1.44 | 1.94 | 1.51 |
| CO | 1.87 | 0.85 | 1.21 | 1.04 | 1.70 | 0.94 |
| HB | 2.75 | 0.92 | 1.05 | 1.49 | 2.18 | 1.29 |
| HO | 3.42 | 0.89 | 1.40 | 0.66 | 1.29 | 0.65 |
| LB | 1.61 | 0.80 | 1.26 | 1.27 | 1.51 | 1.12 |
| LO | 1.27 | 0.98 | 2.59 | 0.88 | 1.87 | 0.68 |

Table G-13: TSS mass loss LS means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TSS | | Mass Response |
|------------------|-----------------|---------------|
| Forage Treatment | <i>p</i> -value | Mass, kg/ha |
| B | 0.5417 | 1.1823 |
| O | | 1.0068 |
| Manure Treatment | | |
| C | 0.3617 | 0.8251 |
| H | | 1.1592 |
| L | | 1.2994 |
| Forage x Manure | | |
| CB | 0.2285 | 0.7333 |
| CO | | 0.9168 |
| HB | | 1.0734 |
| HO | | 1.245 |
| LB | | 1.7403 |
| LO | | 0.8585 |

Table G-14: TSS mass loss LS means and *p* values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TSS | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|--------|--------|--------|--------|--------|
| Mass Response | Mass, kg/ha | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | <i>p</i> = 0.7974 | | | | | |
| B | 5.9778 | 0.9919 | 0.1243 | 0.0000 | 0.0000 | 0.0000 |
| O | 5.7063 | 0.0031 | 0.3313 | 0.0000 | 0.0000 | 0.0000 |
| Manure x Time | <i>p</i> = 0.7015 | | | | | |
| C | 4.8978 | 0.0046 | 0.0482 | 0.0000 | 0.0000 | 0.0000 |
| H | 6.7270 | 0.2283 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| L | 5.9015 | 1.2595 | 0.6353 | 0.0000 | 0.0000 | 0.0000 |
| Forage x Manure x Time | <i>p</i> = 0.3830 | | | | | |
| CB | 4.4000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| CO | 5.3955 | 0.0093 | 0.0963 | 0.0000 | 0.0000 | 0.0000 |
| HB | 5.9838 | 0.4566 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| HO | 7.4702 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| LB | 7.5497 | 2.5191 | 0.3730 | 0.0000 | 0.0000 | 0.0000 |
| LO | 4.2533 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table G-15: TSS concentration loss LS means and p values for forage and manure treatments and forage x manure treatment interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TSS | | Concentration Response |
|------------------|------------|------------------------|
| Forage Treatment | p -value | Concentration, ppm |
| B | 0.6012 | 15.21 |
| O | | 13.02 |
| Manure Treatment | | |
| C | 0.2404 | 10.04 |
| H | | 13.53 |
| L | | 18.78 |
| Forage x Manure | | |
| CB | 0.2255 | 6.37 |
| CO | | 13.72 |
| HB | | 15.18 |
| HO | | 11.89 |
| LB | | 24.09 |
| LO | | 13.47 |

Table G-16: TSS concentration loss LS means and p values for forage and manure treatments and forage x manure treatment time interactions for all rainfall simulation series conducted summer 2003 at Prices Fork Research Farm, Blacksburg, VA.

| TSS | Interactions with Time and Treatment | | | | | |
|------------------------|--------------------------------------|-------|-------|------|------|------|
| Concentration Response | Concentration, ppm | | | | | |
| Time (Run) | 1 | 2 | 3 | 4 | 5 | 6 |
| Forage x Time | $p = 0.6924$ | | | | | |
| B | 72.22 | 16.67 | 2.39 | 0.00 | 0.00 | 0.00 |
| O | 69.93 | 0.67 | 7.55 | 0.00 | 0.00 | 0.00 |
| Manure x Time | $p = 0.6646$ | | | | | |
| C | 55.58 | 1.00 | 3.71 | 0.00 | 0.00 | 0.00 |
| H | 78.70 | 2.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| L | 78.96 | 22.50 | 11.20 | 0.00 | 0.00 | 0.00 |
| Forage x Manure x Time | $p = 0.4869$ | | | | | |
| CB | 38.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CO | 72.90 | 2.00 | 7.42 | 0.00 | 0.00 | 0.00 |
| HB | 86.09 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HO | 71.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LB | 92.36 | 45.00 | 7.17 | 0.00 | 0.00 | 0.00 |
| LO | 65.56 | 0.00 | 15.24 | 0.00 | 0.00 | 0.00 |