

Crop Production Economics – Crop Rotations and Cover Crops in SC Kansas

2009-2010
Kansas State University

**AG
PROFITABILITY
CONFERENCE**

December 16, 2009

AGCO
420 W. Lincoln Blvd.
Hesston, Kansas



Kansas State University
Department of Agricultural Economics

Kevin C. Dhuyvetter
Dept of Ag Economics
Kansas State University
kcd@ksu.edu -- 785-532-3527



Outline of talk...

- What do projected crop budgets look like for 2010?
- Economics associated with several studies from Hesston Experiment Field
 - Two-crop rotation x tillage (wheat versus alternative row crops)
 - No-till crop rotations
 - Cover crops
 - Double cropping forage behind wheat



AgManager.info: Farm Management Guides: Nonirrigated Crops - Windows Internet Explorer

www.agmanager.info/farmmgmt/fmg/nonirrigated/default.asp

Home Farm Management FM Guides Nonirrigated Crops

Non-irrigated Crops

| Crop | Western | South Central | North Central | Northeast | Southeast | Southwest |
|-----------------------|---------|---------------|---------------|-----------|-----------|-----------|
| Wheat | MF-903 | MF-574 | MF-2158 | MF-572 | MF-952 | |
| Grain Sorghum | MF-904 | MF-575 | MF-2159 | MF-573 | MF-955 | |
| Forage Sorghum Silage | | MF-648 | | | | |
| Soybeans | MF-2366 | MF-2156 | MF-2160 | MF-570 | MF-994 | |
| Double Crop Soybeans | | MF-2637 | MF-2637 | MF-2637 | MF-2637 | |
| Com | MF-2160 | MF-2167 | MF-2161 | MF-571 | MF-993 | |
| Com Silage | | | | MF-2364 | | |
| Sunflower | MF-887 | | MF-2144 | MF-2144 | | |
| Double Crop Sunflower | | MF-2145 | MF-2145 | MF-2145 | MF-2145 | |
| Canola | | MF-2421 | | | | |
| Cane Hay | MF-997 | | | | | |
| Alfalfa | MF-2367 | MF-363 | MF-363 | MF-363 | MF-363 | |
| Cotton | | MF-939 | | | MF-939 | MF-2666 |
| Brome Hay | MF-2143 | MF-2143 | MF-2143 | MF-2143 | MF-2143 | |
| Fescue Hay | MF-2146 | MF-2146 | MF-2146 | MF-2146 | MF-2146 | |

Excel Version of Crop Budgets [FM-Guides-Crops-\(2008\).xls](#)

Department of Agricultural Economics K-State Research & Extension College of Agriculture Kansas State University



Farm Management Guides (projected budgets)

Farm Management Guide MF-574

Wheat Cost-Return Budget in South Central Kansas

Department of Agricultural Economics — www.agmanager.info

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Troy J. Dandier Agricultural Economist Douglas Shoop Crops and Soils, SE Kent L. Martin Crops and Soils, SW

Available on www.agmanager.info as either a hard copy (pdf file) or in an Excel spreadsheet

Farm Management Guide MF-575

Grain Sorghum Cost-Return Budget in South Central Kansas

Department of Agricultural Economics — www.agmanager.info

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Troy J. Dandier Agricultural Economist Douglas Shoop Crops and Soils, SE Kent L. Martin Crops and Soils, SW

Farm Management Guide MF-2157

Corn Cost-Return Budget in South Central Kansas

Department of Agricultural Economics — www.agmanager.info

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Troy J. Dandier Agricultural Economist Douglas Shoop Crops and Soils, SE Kent L. Martin Crops and Soils, SW

Farm Management Guide MF-2156

Soybean Cost-Return Budget in South Central Kansas

Department of Agricultural Economics — www.agmanager.info

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Troy J. Dandier Agricultural Economist Douglas Shoop Crops and Soils, SE Kent L. Martin Crops and Soils, SW

Farm Management Guide MF-2537

Double-Crop Soybean Cost-Return Budget in Central and Eastern Kansas

Department of Agricultural Economics — www.agmanager.info

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Troy J. Dandier Agricultural Economist Douglas Shoop Crops and Soils, SE



Values for SC KS Crop budgets as printed (via KSU-Lease.xls)

CROP BUDGETS SHOWING TOTAL COSTS AND RETURNS

| Crop/System | Wht-C | Wht-R | Sorghum | Soybean | Corn | DC SB | Total | Per | Per |
|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Planted acres of each crop | 40.0 | 20.0 | 20.0 | 20.0 | 20.0 | 0.0 | 120.0 | Acres | Acres |
| Tillable acres per planted acre | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 120.0 | Planted | Tillable |
| INCOME PER ACRE | | | | | | | | | |
| A. Yield per acre | 45.0 | 45.0 | 80.0 | 27.0 | 90.0 | 20.0 | --- | --- | --- |
| B. Price per unit | \$4.86 | \$4.86 | \$3.51 | \$8.45 | \$3.71 | \$8.45 | --- | --- | --- |
| C. Net government payments | \$15.35 | \$15.35 | \$15.35 | \$15.35 | \$15.35 | \$0.00 | \$1,842 | \$15.35 | \$15.35 |
| D. Indemnity payments | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| E. Miscellaneous income | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| F. Returns/acre ((A x B) + C + D + E) | \$234.05 | \$234.05 | \$296.15 | \$243.50 | \$349.25 | \$169.00 | \$31,821 | \$265.17 | \$265.18 |
| COSTS PER ACRE | | | | | | | | | |
| 1. Seed | \$13.00 | \$7.80 | \$9.87 | \$41.85 | \$52.29 | \$49.60 | \$2,756 | \$22.97 | \$22.97 |
| 2. Herbicide | 3.04 | 6.38 | 18.58 | 8.70 | 29.26 | 9.72 | 1,380 | 11.50 | 11.50 |
| 3. Insecticide / Fungicide | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 80 | 0.67 | 0.67 |
| 4. Fertilizer and Lime | 48.05 | 37.09 | 44.99 | 15.44 | 50.41 | 8.70 | 4,880 | 40.67 | 40.67 |
| 5. Crop Consulting | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 6. Crop Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 7. Drying | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 8. Miscellaneous | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 | 690 | 5.75 | 5.75 |
| 9. Machinery Expense | 91.74 | 91.74 | 90.71 | 53.17 | 94.00 | 47.49 | 10,262 | 85.52 | 85.52 |
| 10. Non-machinery Labor | 10.40 | 10.40 | 10.27 | 5.98 | 10.66 | 5.33 | 1,162 | 9.68 | 9.69 |
| 11. Irrigation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 12. Land Charge / Rent | 45.00 | 45.00 | 45.00 | 45.00 | 45.00 | 45.00 | 5,400 | 45.00 | 45.00 |
| G. SUB TOTAL | \$217.98 | \$205.15 | \$225.16 | \$175.89 | \$288.37 | \$126.59 | \$26,611 | \$221.76 | \$221.76 |
| 13. Interest on 1/2 Nonland Costs | 5.23 | 4.75 | 5.51 | 4.18 | 7.84 | 4.10 | 655 | 5.46 | 5.46 |
| H. TOTAL COSTS | \$223.21 | \$209.90 | \$230.68 | \$180.07 | \$296.21 | \$130.69 | \$27,266 | \$227.21 | \$227.21 |
| I. RETURNS OVER COSTS (F - H) | \$10.84 | \$24.15 | \$65.47 | \$63.43 | \$53.04 | \$38.31 | \$4,555 | \$37.96 | \$37.96 |
| J. TOTAL COSTS/UNIT (H/A) | \$4.96 | \$4.66 | \$2.88 | \$6.67 | \$3.29 | --- | --- | --- | --- |
| K. RETURN TO TOTAL COST ((+13)/G) | 7.37% | 14.09% | 31.53% | 38.44% | 21.11% | --- | --- | 16.71% | --- |
| M. Breakeven price (w/ base crop) | \$6.07 | \$5.78 | \$3.51 | \$8.53 | \$3.85 | --- | --- | --- | --- |
| N. Breakeven yield (w/ base crop) | 57.4 | 54.5 | 80.4 | 27.3 | 94.1 | --- | --- | --- | --- |

Land costs were held constant in projected budgets

Pressure for land costs to increase in 2010?

Base crop for breakeven analysis 0 0 1 0 0 0
 * All "blue values" are inputs, black values are calculated from those inputs 12:03 PM 12/12/09

Values for SC KS Crop budgets with 12/11/09 forward bids...

CROP BUDGETS SHOWING TOTAL COSTS AND RETURNS

| Crop/System | Wht-C | Wht-R | Sorghum | Soybean | Corn | DC SB | Total | Per | Per |
|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Planted acres of each crop | 40.0 | 20.0 | 20.0 | 20.0 | 20.0 | 0.0 | 120.0 | Acres | Acres |
| Tillable acres per planted acre | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 120.0 | Planted | Tillable |
| INCOME PER ACRE | | | | | | | | | |
| A. Yield per acre | 45.0 | 45.0 | 80.0 | 27.0 | 90.0 | 20.0 | --- | --- | --- |
| B. Price per unit | \$4.78 | \$4.78 | \$3.49 | \$9.21 | \$3.86 | \$9.21 | --- | --- | --- |
| C. Net government payments | \$15.35 | \$15.35 | \$15.35 | \$15.35 | \$15.35 | \$0.00 | \$1,842 | \$15.35 | \$15.35 |
| D. Indemnity payments | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| E. Miscellaneous income | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| F. Returns/acre ((A x B) + C + D + E) | \$230.45 | \$230.45 | \$294.55 | \$264.02 | \$362.75 | \$184.20 | \$32,253 | \$268.78 | \$268.78 |
| COSTS PER ACRE | | | | | | | | | |
| 1. Seed | \$13.00 | \$7.80 | \$9.87 | \$41.85 | \$52.29 | \$49.60 | \$2,756 | \$22.97 | \$22.97 |
| 2. Herbicide | 3.04 | 6.38 | 18.58 | 8.70 | 29.26 | 9.72 | 1,380 | 11.50 | 11.50 |
| 3. Insecticide / Fungicide | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 80 | 0.67 | 0.67 |
| 4. Fertilizer and Lime | 48.05 | 37.09 | 44.99 | 15.44 | 50.41 | 8.70 | 4,880 | 40.67 | 40.67 |
| 5. Crop Consulting | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 6. Crop Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 7. Drying | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 8. Miscellaneous | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 | 690 | 5.75 | 5.75 |
| 9. Machinery Expense | 91.74 | 91.74 | 90.71 | 53.17 | 94.00 | 47.49 | 10,262 | 85.52 | 85.52 |
| 10. Non-machinery Labor | 10.40 | 10.40 | 10.27 | 5.98 | 10.66 | 5.33 | 1,162 | 9.68 | 9.69 |
| 11. Irrigation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 12. Land Charge / Rent | 45.00 | 45.00 | 45.00 | 45.00 | 45.00 | 45.00 | 5,400 | 45.00 | 45.00 |
| G. SUB TOTAL | \$217.98 | \$205.15 | \$225.16 | \$175.89 | \$288.37 | \$126.59 | \$26,611 | \$221.76 | \$221.76 |
| 13. Interest on 1/2 Nonland Costs | 5.23 | 4.75 | 5.51 | 4.18 | 7.84 | 4.10 | 655 | 5.46 | 5.46 |
| H. TOTAL COSTS | \$223.21 | \$209.90 | \$230.68 | \$180.07 | \$296.21 | \$130.69 | \$27,266 | \$227.21 | \$227.21 |
| I. RETURNS OVER COSTS (F - H) | \$7.24 | \$20.55 | \$63.87 | \$83.95 | \$66.54 | \$53.51 | \$4,988 | \$41.56 | \$41.56 |
| J. TOTAL COSTS/UNIT (H/A) | \$4.96 | \$4.66 | \$2.88 | \$6.67 | \$3.29 | --- | --- | --- | --- |
| K. RETURN TO TOTAL COST ((+13)/G) | 5.72% | 12.33% | 30.82% | 50.11% | 25.79% | --- | --- | --- | --- |
| M. Breakeven price (w/ base crop) | \$6.04 | \$5.74 | \$3.49 | \$8.47 | \$3.83 | --- | --- | --- | --- |
| N. Breakeven yield (w/ base crop) | 58.1 | 55.1 | 80.4 | 24.8 | 89.6 | --- | --- | --- | --- |

Based on current forward contract bids, average yields and costs, 2010 potential looks decent.

Base crop for breakeven analysis 0 0 1 0 0 0
 * All "blue values" are inputs, black values are calculated from those inputs 11:45 AM 12/13/09

Values for NC KS Crop budgets as printed (via KSU-Lease.xls)

CROP BUDGETS SHOWING TOTAL COSTS AND RETURNS

| Crop/System | Wht-C | Wht-R | Sorghum | Soybean | Corn | DC SB | Total | Per | Per |
|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Planted acres of each crop | 40.0 | 20.0 | 20.0 | 20.0 | 20.0 | 0.0 | 120.0 | Acres | Acres |
| Tillable acres per planted acre | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 120.0 | Planted | Tillable |
| INCOME PER ACRE | | | | | | | | | |
| A. Yield per acre | 57.0 | 52.0 | 90.0 | 35.0 | 90.0 | 20.0 | --- | --- | --- |
| B. Price per unit | \$4.81 | \$4.81 | \$3.43 | \$8.27 | \$3.55 | \$8.27 | --- | --- | --- |
| C. Net government payments | \$14.16 | \$14.16 | \$14.16 | \$14.16 | \$14.16 | \$0.00 | \$1,699 | \$14.16 | \$14.16 |
| D. Indemnity payments | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| E. Miscellaneous income | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| F. Returns/acre ((A x B) + C + D + E) | \$288.33 | \$264.28 | \$322.86 | \$303.61 | \$333.66 | \$165.40 | \$36,021 | \$300.18 | \$300.18 |
| COSTS PER ACRE | | | | | | | | | |
| 1. Seed | \$13.00 | \$11.70 | \$15.36 | \$43.40 | \$84.72 | \$49.60 | \$3,624 | \$30.20 | \$30.20 |
| 2. Herbicide | 5.99 | 5.99 | 32.87 | 20.65 | 27.10 | 9.72 | 1,972 | 16.43 | 16.43 |
| 3. Insecticide / Fungicide | 26.28 | 26.28 | 0.00 | 0.00 | 0.00 | 0.00 | 1,577 | 13.14 | 13.14 |
| 4. Fertilizer and Lime | 45.83 | 33.61 | 42.40 | 18.49 | 41.42 | 8.70 | 4,551 | 37.93 | 37.93 |
| 5. Crop Consulting | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 6. Crop Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 7. Drying | 0.00 | 0.00 | 11.70 | 0.00 | 11.70 | 0.00 | 468 | 3.90 | 3.90 |
| 8. Miscellaneous | 6.25 | 6.25 | 6.25 | 6.25 | 6.25 | 6.25 | 750 | 6.25 | 6.25 |
| 9. Machinery Expense | 60.56 | 86.51 | 79.67 | 60.31 | 75.33 | 47.49 | 8,459 | 70.49 | 70.49 |
| 10. Non-machinery Labor | 6.89 | 9.75 | 8.97 | 6.76 | 8.45 | 5.33 | 954 | 7.95 | 7.95 |
| 11. Irrigation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 12. Land Charge / Rent | 57.00 | 57.00 | 57.00 | 57.00 | 57.00 | 57.00 | 6,840 | 57.00 | 57.00 |
| G. SUB TOTAL | \$221.79 | \$237.08 | \$254.21 | \$212.85 | \$311.97 | \$127.09 | \$29,194 | \$243.28 | \$243.28 |
| 13. Interest on 1/2 Nonland Costs | 5.35 | 5.57 | 5.87 | 5.02 | 8.09 | 4.12 | 705 | 5.87 | 5.87 |
| H. TOTAL COSTS | \$227.14 | \$242.65 | \$260.08 | \$217.87 | \$320.07 | \$131.21 | \$29,899 | \$249.16 | \$249.16 |
| I. RETURNS OVER COSTS (F - H) | \$61.19 | \$21.63 | \$62.78 | \$85.74 | \$13.59 | \$34.19 | \$6,122 | \$51.02 | \$51.02 |
| J. TOTAL COSTS/UNIT (H/A) | \$3.98 | \$4.67 | \$2.89 | \$6.22 | \$3.56 | \$6.56 | --- | --- | --- |
| K. RETURN TO TOTAL COST ((+13)/G) | 30.00% | 11.47% | 27.00% | 42.64% | 6.95% | 30.14% | 20.48% | 20.48% | 20.48% |
| M. Breakeven price (w/ base crop) | \$5.24 | \$6.04 | \$3.69 | \$8.27 | \$4.35 | \$10.85 | --- | --- | --- |
| N. Breakeven yield (w/ base crop) | 62.7 | 66.7 | 98.2 | 35.1 | 113.8 | 26.5 | --- | --- | --- |

Values for NC KS Crop budgets with 12/11/09 forward bids...

CROP BUDGETS SHOWING TOTAL COSTS AND RETURNS

| Crop/System | Wht-C | Wht-R | Sorghum | Soybean | Corn | DC SB | Total | Per | Per |
|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Planted acres of each crop | 40.0 | 20.0 | 20.0 | 20.0 | 20.0 | 0.0 | 120.0 | Acres | Acres |
| Tillable acres per planted acre | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 120.0 | Planted | Tillable |
| INCOME PER ACRE | | | | | | | | | |
| A. Yield per acre | 57.0 | 52.0 | 90.0 | 35.0 | 90.0 | 20.0 | --- | --- | --- |
| B. Price per unit | \$4.78 | \$4.78 | \$3.49 | \$9.21 | \$3.86 | \$9.21 | --- | --- | --- |
| C. Net government payments | \$14.16 | \$14.16 | \$14.16 | \$14.16 | \$14.16 | \$0.00 | \$1,699 | \$14.16 | \$14.16 |
| D. Indemnity payments | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| E. Miscellaneous income | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0 | \$0.00 | \$0.00 |
| F. Returns/acre ((A x B) + C + D + E) | \$286.62 | \$262.72 | \$328.26 | \$336.51 | \$361.56 | \$184.20 | \$37,246 | \$310.38 | \$310.38 |
| COSTS PER ACRE | | | | | | | | | |
| 1. Seed | \$13.00 | \$11.70 | \$15.36 | \$43.40 | \$84.72 | \$49.60 | \$3,624 | \$30.20 | \$30.20 |
| 2. Herbicide | 5.99 | 5.99 | 32.87 | 20.65 | 27.10 | 9.72 | 1,972 | 16.43 | 16.43 |
| 3. Insecticide / Fungicide | 26.28 | 26.28 | 0.00 | 0.00 | 0.00 | 0.00 | 1,577 | 13.14 | 13.14 |
| 4. Fertilizer and Lime | 45.83 | 33.61 | 42.40 | 18.49 | 41.42 | 8.70 | 4,551 | 37.93 | 37.93 |
| 5. Crop Consulting | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 6. Crop Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 7. Drying | 0.00 | 0.00 | 11.70 | 0.00 | 11.70 | 0.00 | 468 | 3.90 | 3.90 |

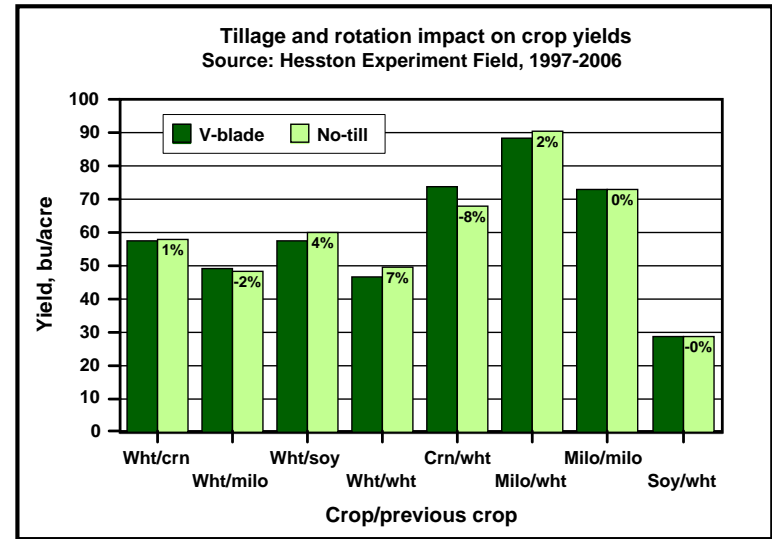


Two-crop rotation x tillage study...

- **Wheat rotated with...**
 - wheat (continuous cropping), sorghum, corn, or soybeans
- **Sorghum rotated with...**
 - sorghum (continuous cropping) and wheat
- **Tillage**
 - v-blade and no-till (all wheat planted no-till after row crop)
- **10 years of yield data, 1997-2006** (no corn yields in 2000)
- **Costs based on Mathew Pachta's M.S. thesis** (2008 custom rates and 2009 input prices)



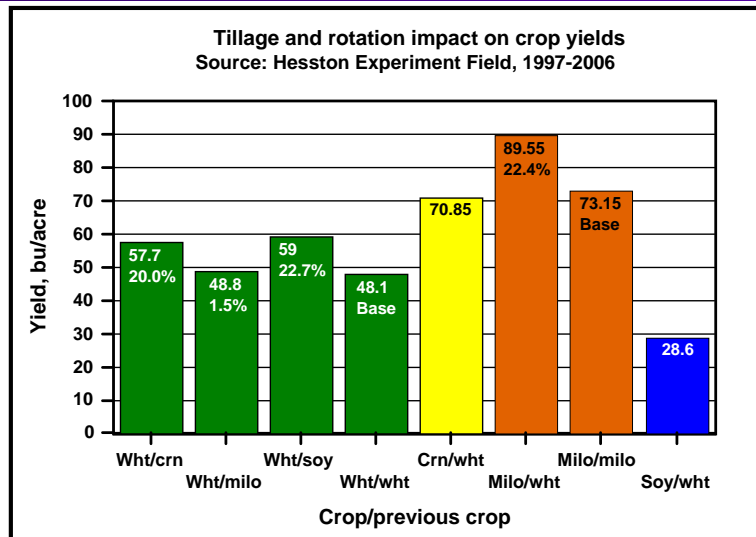
Rotation has bigger impact on yield than tillage...



Source: M.M. Claassen, KSU Agronomy Field Research 2007 Report of Progress 992



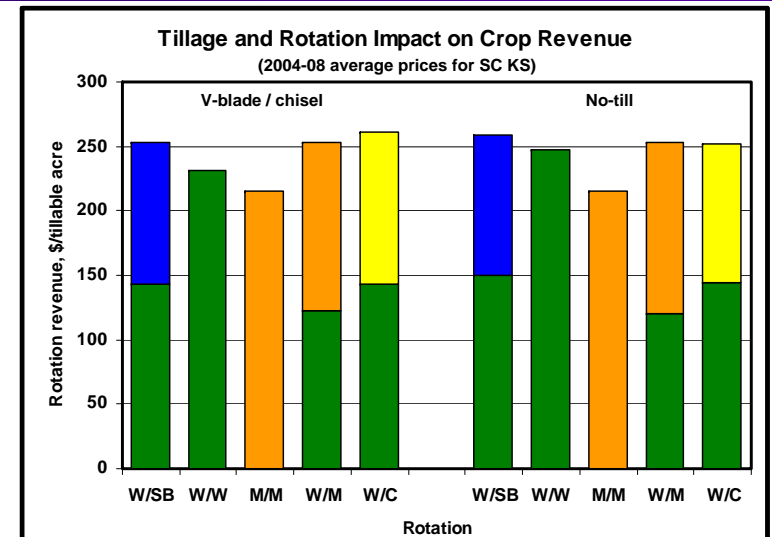
Rotation has bigger impact on yield than tillage...



Source: M.M. Claassen, KSU Agronomy Field Research 2007 Report of Progress 992



Continuous cropping generates less revenue...

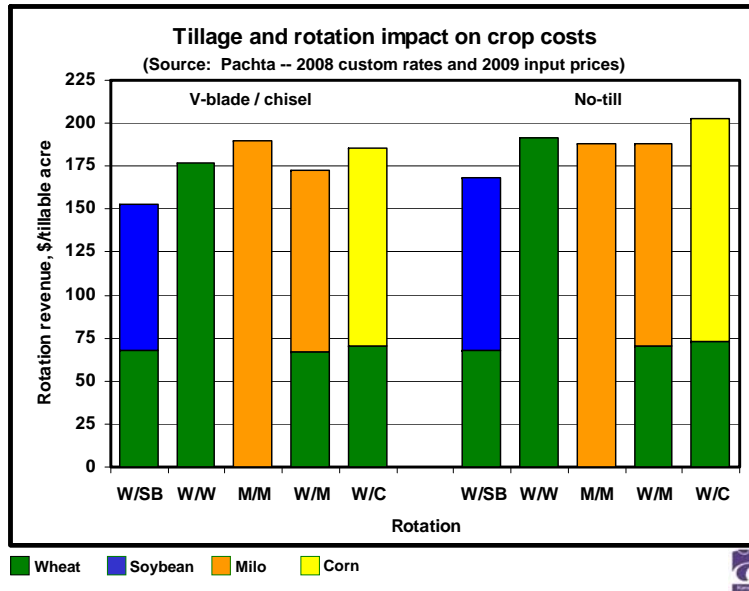


Wheat Soybean Milo Corn

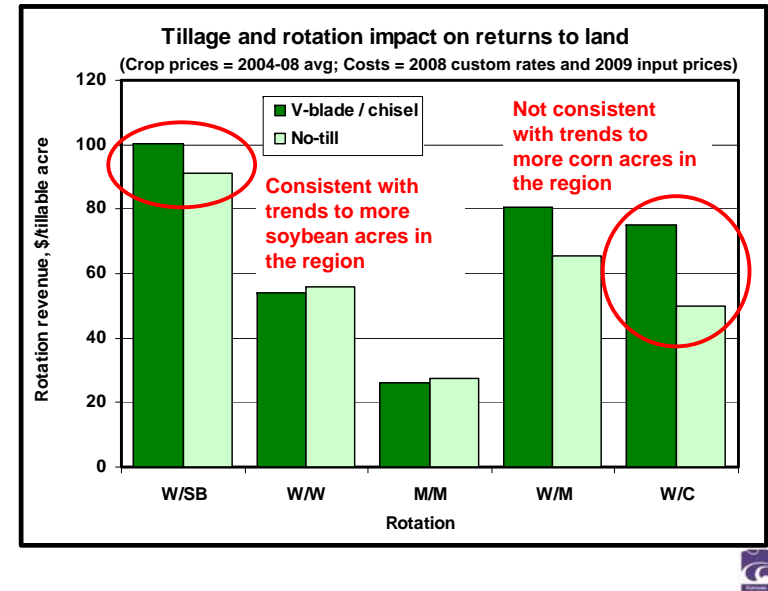




Costs are slightly lower with tillage systems...



No-till systems slightly less profitable, but rotation has bigger impact...

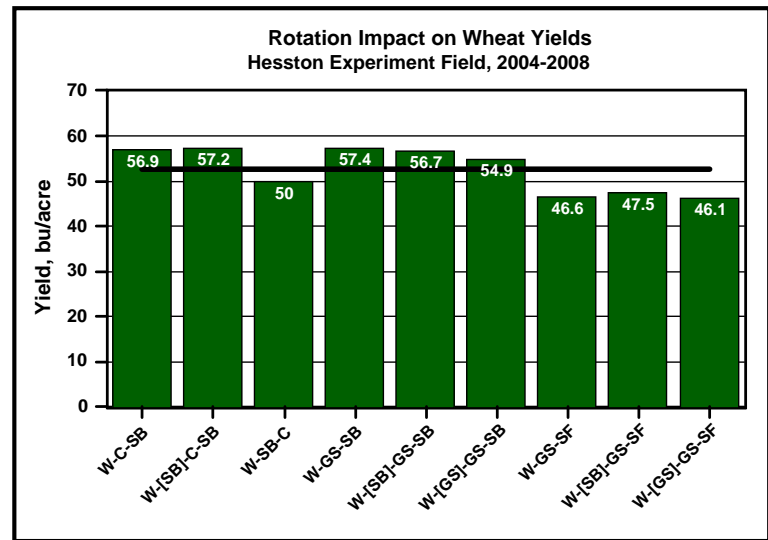


No-till crop rotations study...

- Study initiated in 2001 (data collection to determine cropping system effects began in 2004)
- 11 no-till crop rotations (including five different crops)
 - W-C-SB | W-[SB]-C-SB | W-SB-C
 - W-GS-SB | W-[SB]-GS-SB | W-[GS]-GS-SB
 - W-GS-SF | W-[SB]-GS-SF | W-[GS]-GS-SF
 - GS-C-SB
 - GS-GS-GS
- 5 years of yield data, 2004-08
- Costs based on NC KS Farm Management Guides (with fertilizer rates adjusted to be consistent with yields)



Wheat yields are best following soybeans...

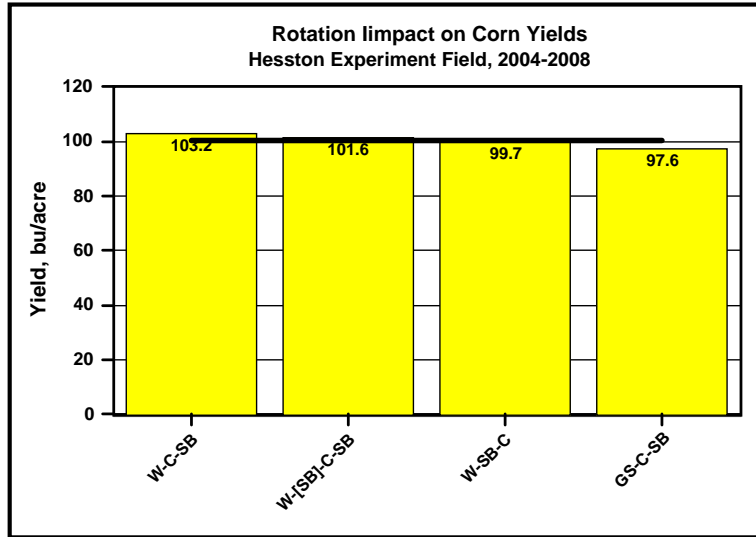


Source: Claassen and Regehr, KSU Agronomy Field Research 2009 Report of Progress 1017





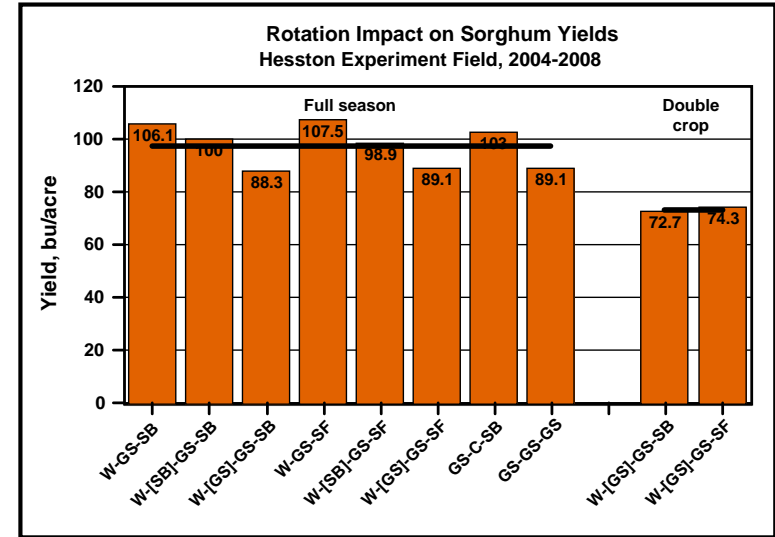
No rotation effect on corn yields...



Source: Claassen and Regehr, KSU Agronomy Field Research 2009 Report of Progress 1017



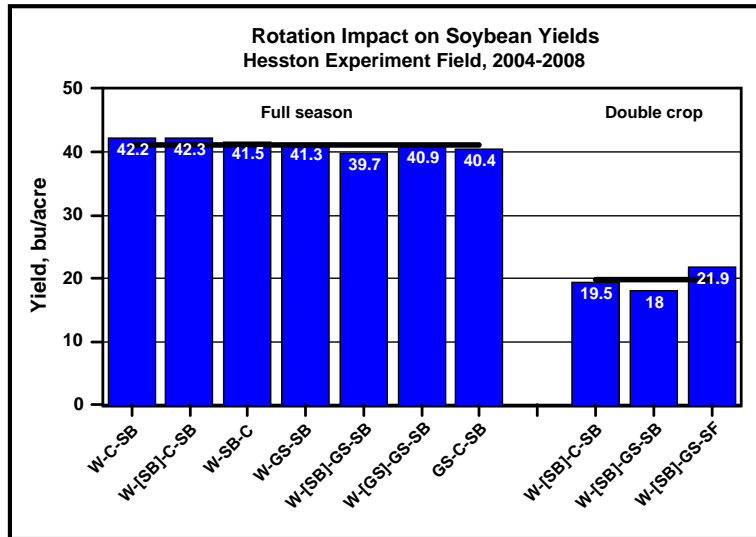
Sorghum yields are best following wheat...



Source: Claassen and Regehr, KSU Agronomy Field Research 2009 Report of Progress 1017



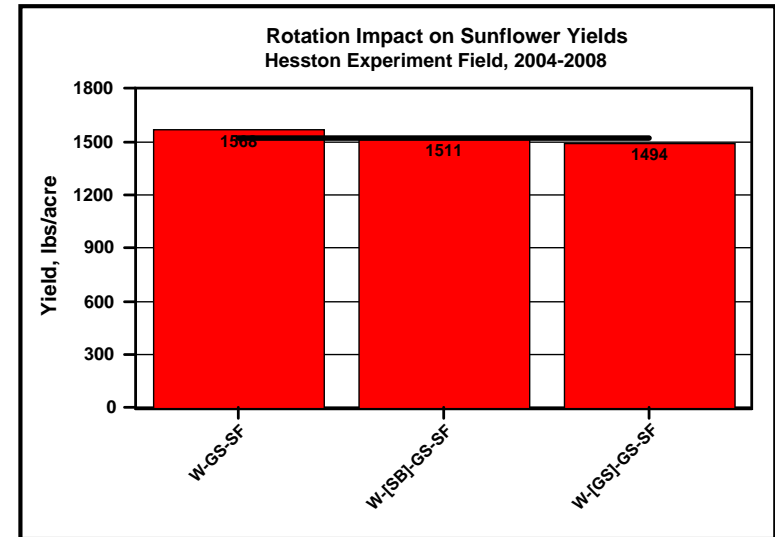
No rotation effect on soybean yields...



Source: Claassen and Regehr, KSU Agronomy Field Research 2009 Report of Progress 1017



No rotation effect on sunflower yields...

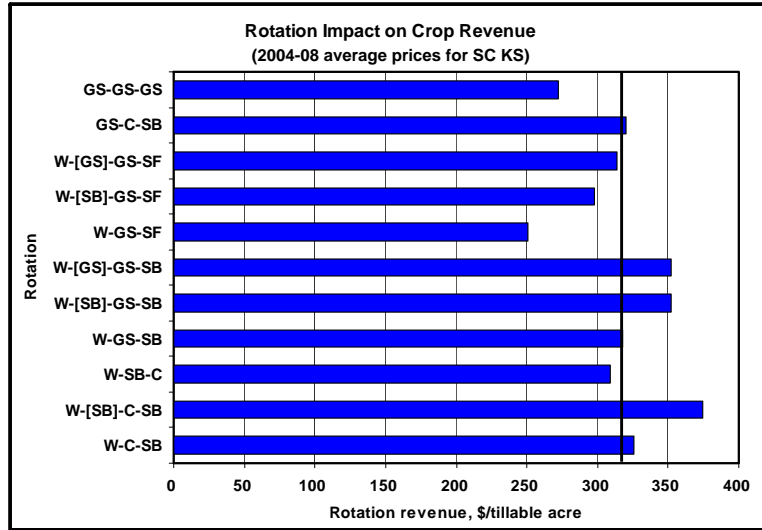


Source: Claassen and Regehr, KSU Agronomy Field Research 2009 Report of Progress 1017

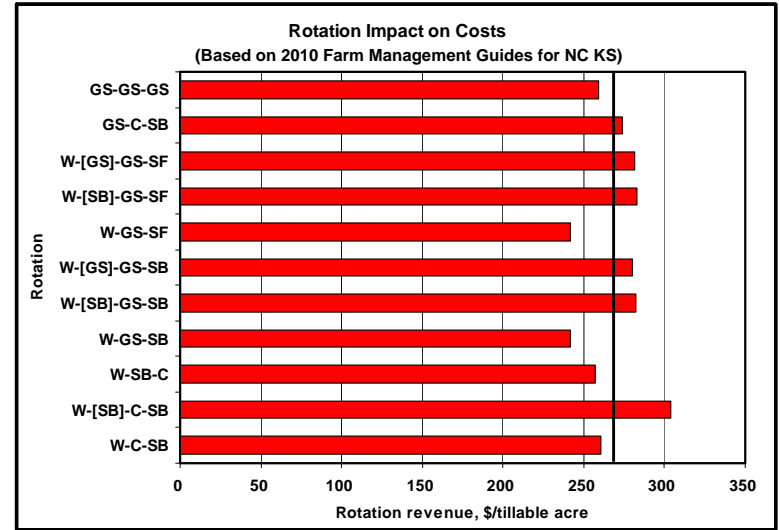




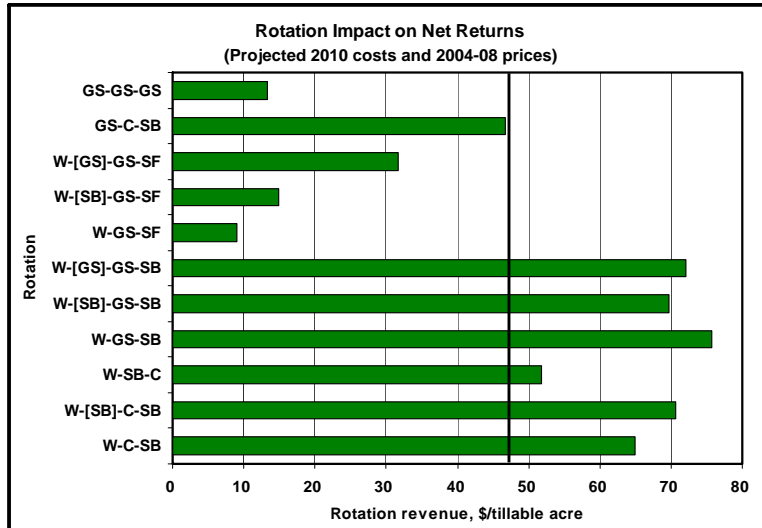
Revenue by rotation...



Costs by rotation...



Net returns by rotation...



Economic comparison of rotations (5-yr avg prices)...

Net Returns by Rotation (5-yr avg prices, current projected costs)

| Rotation | Gross revenue | Total costs | Profit |
|----------------|-----------------|-----------------|----------------|
| W-C-SB | \$325.76 | \$260.73 | \$65.02 #5 |
| W-[SB]-C-SB | \$374.60 | \$304.02 | \$70.58 #3 |
| W-SB-C | \$308.81 | \$256.96 | \$51.84 |
| W-GS-SB | \$317.46 | \$241.76 | \$75.70 #1 |
| W-[SB]-GS-SB | \$352.28 | \$282.53 | \$69.75 #4 |
| W-[GS]-GS-SB | \$352.23 | \$280.17 | \$72.06 #2 |
| W-GS-SF | \$250.64 | \$241.56 | \$9.08 |
| W-[SB]-GS-SF | \$297.73 | \$282.87 | \$14.86 |
| W-[GS]-GS-SF | \$313.54 | \$281.86 | \$31.68 |
| GS-C-SB | \$320.34 | \$273.66 | \$46.67 |
| GS-GS-GS | \$272.55 | \$259.24 | \$13.31 |
| Average | \$316.90 | \$269.58 | \$47.32 |
| Min | \$250.64 | \$241.56 | \$9.08 |
| Max | \$374.60 | \$304.02 | \$75.70 |
| Range | \$123.96 | \$62.46 | \$66.62 |





Economic comparison of rotations (current prices)...

Net Returns by Rotation (current bids, current projected costs)

| Rotation | Gross revenue | Total costs | Profit |
|--------------|---------------|-------------|----------------|
| W-C-SB | \$367.16 | \$260.73 | \$106.42 #5 |
| W-[SB]-C-SB | \$425.75 | \$304.02 | #1 \$121.73 #3 |
| W-SB-C | \$349.51 | \$256.96 | \$92.55 |
| W-GS-SB | \$355.84 | \$241.76 | #4 \$114.08 #1 |
| W-[SB]-GS-SB | \$397.97 | \$282.53 | #3 \$115.45 #4 |
| W-[GS]-GS-SB | \$398.71 | \$280.17 | #2 \$118.54 #2 |
| W-GS-SF | \$279.85 | \$241.56 | \$38.29 |
| W-[SB]-GS-SF | \$336.10 | \$282.87 | \$53.22 |
| W-[GS]-GS-SF | \$356.22 | \$281.86 | \$74.36 |
| GS-C-SB | \$383.59 | \$273.66 | #5 \$109.93 |
| GS-GS-GS | \$325.12 | \$259.24 | \$65.88 |
| Average | \$361.44 | \$269.58 | \$91.86 |
| Min | \$279.85 | \$241.56 | \$38.29 |
| Max | \$425.75 | \$304.02 | \$121.73 |
| Range | \$145.90 | \$62.46 | \$83.44 |

Current bids changes things around a little bit...



Economics of Double / Cover Crops

Planting a crop after wheat to...

- harvest as an additional cash grain crop
- increase residue, improve soil quality, fix N, suppress weeds, etc.
 - Research study from Hesston (2005-2008)
- harvest as a forage crop (graze or bale)
 - Research study from Hesston (2002-2005)

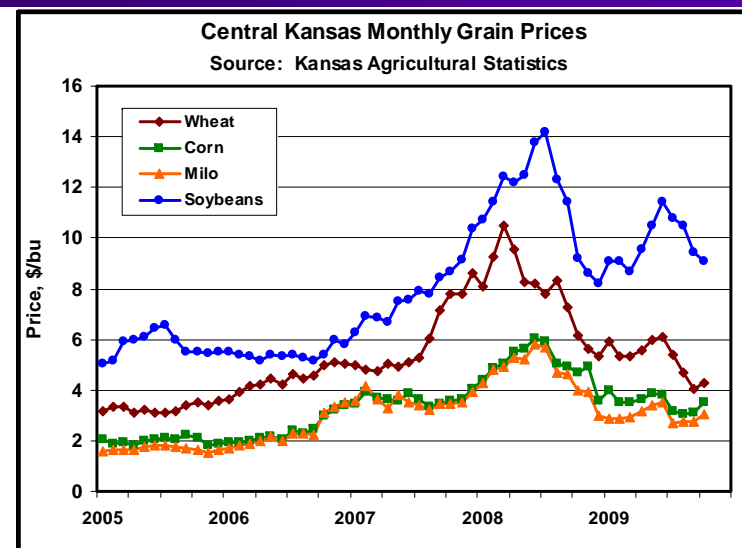


Key factors driving the economics of planting a crop after wheat...

- Prices of outputs (crops) and inputs (seed, fertilizer)
- Crop yield
- Value of nutrients removed / credited
- Costs of establishing and harvesting crop
 - No-till versus tillage
 - Baling vs. grazing
- Impact on yield of following crop(s)
- Impact of costs of following crop(s)

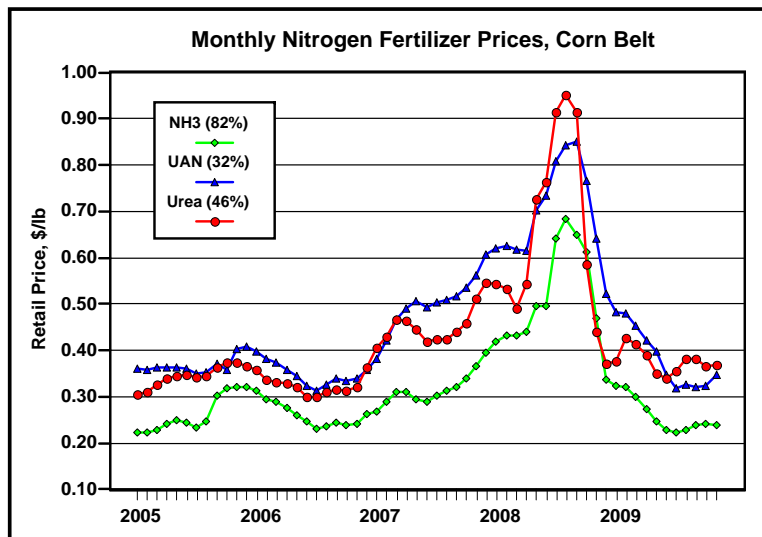


Crop prices have fallen significantly, but they are still relatively strong by historical standards...





Nitrogen fertilizer prices are down significantly from peaks of a year ago...



Summer cover crops after wheat (wheat-sorghum rotation)

Hesston Experiment Field, 2005-2009
Mark Claassen

Cover crops considered:

Sunn hemp and forage soybean

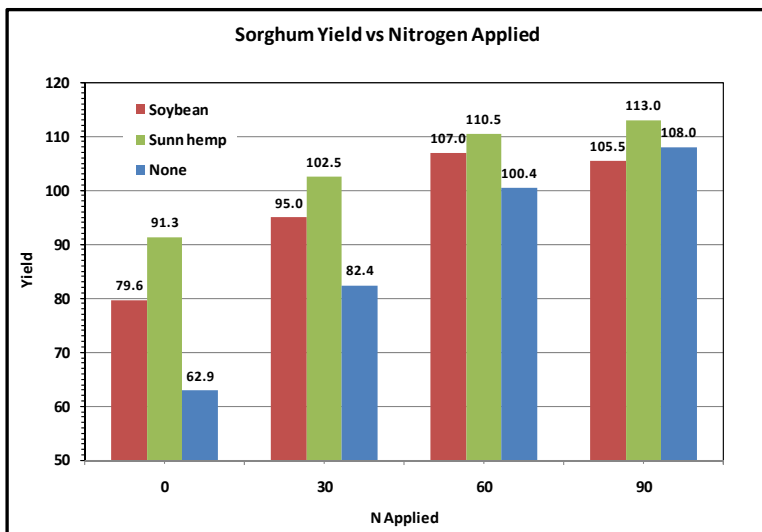
4-years of yield data

Sorghum, 2005-2008

Wheat, 2006-2009



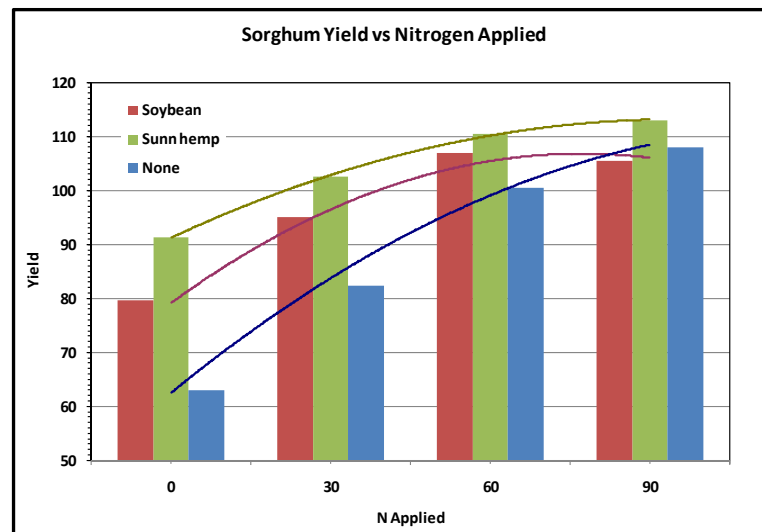
4-yr average (2004-08) sorghum yields...



Source: Claassen, various KSU Agronomy Field Research reports

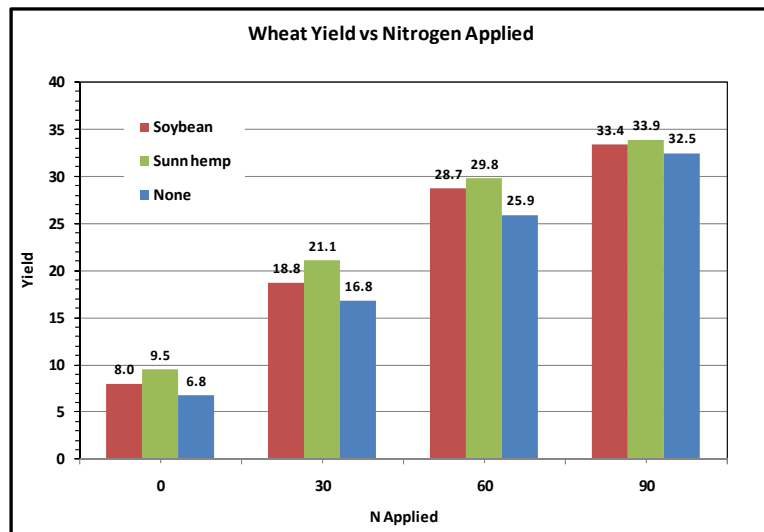


"Flatter" response to N with cover crops...





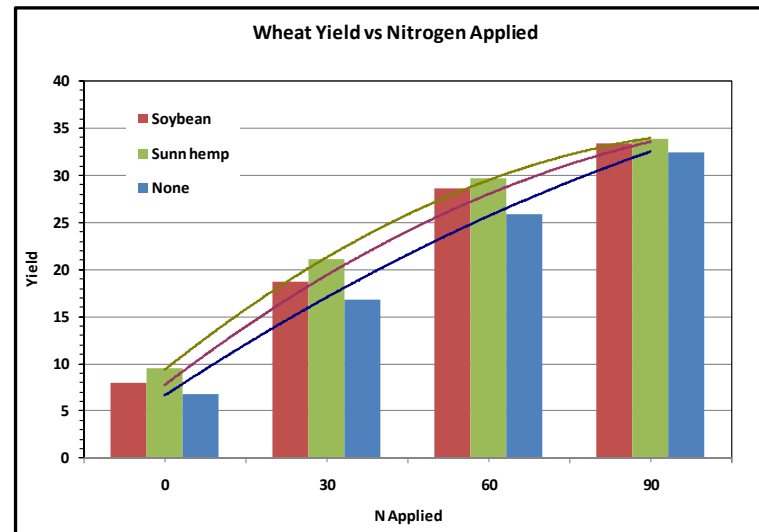
4-yr average (2005-09) wheat yields...



Source: Claassen, various KSU Agronomy Field Research reports



Residual effect from cover crops exists...



Economic analysis of summer cover crops after wheat... (Hesston Experiment Field)

- **Partial budget comparing control (no cover crop) to alternative cover crops**
 - Cost of chemical fallow vs. establishing of cover crop
 - N credit for the following cash crop (if any)
 - Impact on yield of following crop (+/-)
- **Net returns to cover crop (improvement from control)**
- **Yields and N effects estimated two ways**
 - Model estimated yield and optimal N rate (lines on prev fig)
 - “Best” actual average yield and N rate (bars on prev fig)



Cover crop partial budgets...

| Cover Crop Partial Budget | No cover | Forage soybean | Sunn hemp |
|---------------------------|----------------|----------------|----------------|
| Seed, \$/ac | \$0.00 | \$31.20 | \$20.00 |
| Seeding rate, lbs/ac | 0 | 60 | 10 |
| Seed cost, \$/lb | \$0.00 | \$0.52 | \$2.00 |
| Planting, \$/ac | \$0.00 | \$12.00 | \$12.00 |
| Herbicide, \$/ac | \$21.54 | \$21.54 | \$34.05 |
| Chemical, \$/ac | \$11.41 | \$11.41 | \$19.43 |
| Number of applications | 2.25 | 2.25 | 3.25 |
| Application cost, \$/ac | \$4.50 | \$4.50 | \$4.50 |
| Roller/crimper, \$/ac | \$0.00 | \$6.00 | \$6.00 |
| Total Cost | \$21.54 | \$70.74 | \$72.05 |



Assumptions:

- Planted with no-till drill
- Chemical costs for wheat at harvest through end of fall time period
- Sunn hemp sprayed 50% of the time to terminate crop





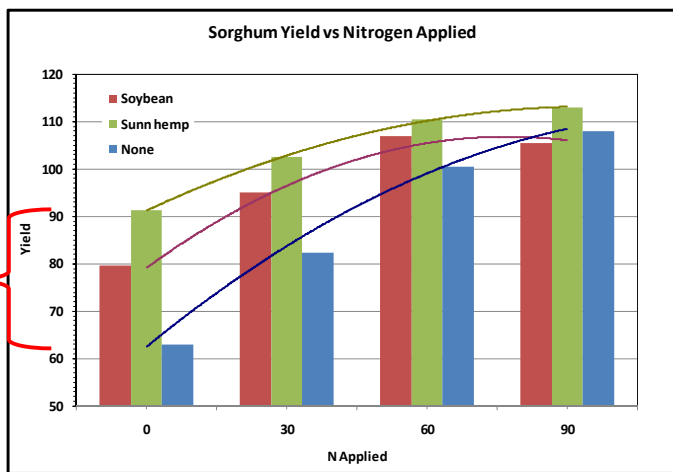
Yield Benefits from Cover Crops

Notice the yield boost with no applications of N.

The boost comes from improvements in soil productivity.

For sunn hemp, this persists, even with increasing N.

Is it high enough with N credit to cover establishment costs?



Model-estimated yields and N rates analysis...

Return over Optimal N and Cover Crop Establishment Costs

| | No cover (base) | Cover crop Soybean | Cover crop Sunn hemp |
|-------------------------------------|-----------------|--------------------|----------------------|
| Sorghum | | | |
| Optimal N, lbs/a | 105.3 | 64.8 | 71.9 |
| Yield, bu/a | 111.0 | 106.1 | 111.8 |
| Return over N, \$/a | \$346.33 | \$345.41 | \$362.66 |
| Difference from base, \$/a | base | -\$0.92 | \$16.33 |
| Cover crop establishment, \$/a | \$21.54 | \$70.74 | \$72.05 |
| Return over N and cover costs, \$/a | \$324.79 | \$274.67 | \$290.61 |
| Difference from base, \$/a | base | -\$50.12 | -\$34.18 |
| Wheat | | | |
| N, lbs/a | 120.0 | 105.2 | 90.8 |
| Yield, bu/a | 37.6 | 35.2 | 34.0 |
| Return, \$/a | \$132.48 | \$127.02 | \$127.01 |
| Difference from base, \$/a | base | -\$5.46 | \$5.47 |
| Rotation average, \$/a | \$228.64 | \$200.84 | \$208.81 |
| Difference from base, \$/a | base | -\$27.79 | -\$19.82 |

Prices: N = \$0.40/lb; sorghum = \$3.50/bu; wheat = \$4.80/bu

Requires an N price of \$1.59/lb to breakeven (all else equal)

Requires an N price of \$0.94/lb to breakeven (all else equal)



Actual average yields and N rates analysis...

Return over Optimal N and Cover Crop Establishment Costs

| | No cover (base) | Cover crop Soybean | Cover crop Sunn hemp |
|-------------------------------------|-----------------|--------------------|----------------------|
| Sorghum | | | |
| N rate, lbs/a | 90.0 | 60.0 | 60.0 |
| Yield, bu/a | 108.0 | 107.0 | 110.5 |
| Return over N, \$/a | \$342.09 | \$350.33 | \$362.66 |
| Difference from base, \$/a | base | \$8.24 | \$20.57 |
| Cover crop establishment, \$/a | \$21.54 | \$70.74 | \$72.05 |
| Return over N and cover costs, \$/a | \$320.55 | \$279.59 | \$290.61 |
| Difference from base, \$/a | base | -\$40.96 | -\$29.94 |
| Wheat | | | |
| N, lbs/a | 90.0 | 90.0 | 90.0 |
| Yield, bu/a | 32.5 | 33.4 | 33.9 |
| Return, \$/a | \$119.76 | \$124.08 | \$126.60 |
| Difference from base, \$/a | base | \$4.32 | \$6.84 |
| Rotation average, \$/a | \$220.16 | \$201.83 | \$208.61 |
| Difference from base, \$/a | base | -\$18.32 | -\$11.55 |

Prices: N = \$0.40/lb; sorghum = \$3.50/bu; wheat = \$4.80/bu

Prices of N needs to increase to \$0.67/lb to before reduce to 60 lbs (all else equal)

Prices of N needs to increase to \$0.75/lb to before reduce to 60 lbs (all else equal)



Doubling prices of N...

Return over Optimal N and Cover Crop Establishment Costs

| | No cover (base) | Cover crop Soybean | Cover crop Sunn hemp |
|-------------------------------------|-----------------|--------------------|----------------------|
| Sorghum | | | |
| Optimal N, lbs/a | 87.9 | 52.6 | 48.1 |
| Yield, bu/a | 108.0 | 104.0 | 107.8 |
| Return over N, \$/a | \$307.70 | \$321.92 | \$338.68 |
| Difference from base, \$/a | base | \$14.23 | \$30.98 |
| Cover crop establishment, \$/a | \$21.54 | \$70.74 | \$72.05 |
| Return over N and cover costs, \$/a | \$286.16 | \$251.18 | \$266.63 |
| Difference from base, \$/a | base | -\$34.97 | -\$19.53 |
| Wheat | | | |
| N, lbs/a | 106.2 | 80.5 | 70.7 |
| Yield, bu/a | 35.5 | 32.1 | 31.5 |
| Return, \$/a | \$85.38 | \$89.87 | \$94.71 |
| Difference from base, \$/a | base | \$4.48 | \$9.33 |
| Rotation average, \$/a | \$185.77 | \$170.53 | \$180.67 |
| Difference from base, \$/a | base | -\$15.24 | -\$5.10 |

Prices: N = \$0.80/lb; sorghum = \$3.50/bu; wheat = \$4.80/bu

Return over Optimal N and Cover Crop Establishment Costs

| | No cover (base) | Cover crop Soybean | Cover crop Sunn hemp |
|-------------------------------------|-----------------|--------------------|----------------------|
| Sorghum | | | |
| N rate, lbs/a | 90.0 | 60.0 | 60.0 |
| Yield, bu/a | 108.0 | 107.0 | 110.5 |
| Return over N, \$/a | \$306.09 | \$326.33 | \$338.66 |
| Difference from base, \$/a | base | \$20.24 | \$32.57 |
| Cover crop establishment, \$/a | \$21.54 | \$70.74 | \$72.05 |
| Return over N and cover costs, \$/a | \$284.55 | \$255.59 | \$266.61 |
| Difference from base, \$/a | base | -\$28.96 | -\$17.94 |
| Wheat | | | |
| N, lbs/a | 90.0 | 60.0 | 60.0 |
| Yield, bu/a | 32.5 | 28.7 | 29.8 |
| Return, \$/a | \$83.76 | \$89.64 | \$94.80 |
| Difference from base, \$/a | base | \$5.88 | \$11.04 |
| Rotation average, \$/a | \$184.16 | \$172.61 | \$180.71 |
| Difference from base, \$/a | base | -\$11.54 | -\$3.45 |

Prices: N = \$0.80/lb; sorghum = \$3.50/bu; wheat = \$4.80/bu

Need to figure out ways to lower cost of establishing cover crop because yield and nitrogen benefits are not large enough to overcome costs...

Sunn hemp has an advantage over forage soybeans (what if you decide to hay/graze?)





Summary of cover crops ...

- When considering the economics of adding cover crops to existing cropping rotations, consider:
 - Benefits: soil productivity, yield gains, nitrogen fixation (credit), and cost savings
 - Costs: establishment costs, management intensity, foregone opportunities (e.g., forage, double crop), equipment needs.
- Benefits and costs for a given crop enterprise depend on economic factors, such as N price, commodity prices, seed costs, crop rotations, etc.
 - With higher N prices, cover crops become more economically viable.
 - Management will play a key factor in the success of a cover crop, as well.



Double crop summer forages after wheat

Hesston Experiment Field, 2002-2005

Mark Claassen

Crops considered:

Cowpea, Soybean, Forage soybean, Sunn hemp, Sunflower, Pearl millet, Grain sorghum, Sudangrass, Sorghum x sudangrass



Economic analysis of double crop forage after wheat...

- Partial budget comparing control (no double crop) to alternative forage crops
 - Income of forage crop + N credit (if any)
 - Costs of chem fallow vs. establishing cover crop
 - Harvest costs
 - Impact on yield of following crop (+/-)
 - Impact of costs on following crop (+/-)
- Net returns to forage crop (improvement from control)
- All forages assumed to be of equal value
- Breakeven forage price and yield
- Ignored land cost (i.e., assumed owned land or cash rent)



Table 3. Economics of Double-crop Summer Forages after Wheat -- KSU Hesston Experiment Field
Scenario #1: No nitrogen credit for legumes & no impact on yield of following crop

| | Control | Double-crop Forage | | | | | | | | |
|---------------------------------|----------|--------------------|----------|----------------|-----------|-----------|--------------|---------------|------------|----------------------|
| | | Cowpea | Soybean | Forage soybean | Sunn Hemp | Sunflower | Pearl millet | Grain sorghum | Sudangrass | Sorghum x sudangrass |
| INCOME | | | | | | | | | | |
| Yield, DM tons | 0.00 | 1.16 | 1.65 | 1.60 | 2.37 | 2.34 | 1.76 | 3.48 | 3.15 | 4.54 |
| Harvested yield, tons/ac | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 | 4.08 |
| Nitrogen credit, lbs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Forage price, \$/ton | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 |
| Income, \$/ac | \$0.00 | \$62.49 | \$88.93 | \$86.02 | \$127.64 | \$126.02 | \$94.92 | \$187.51 | \$189.71 | \$244.67 |
| COSTS | | | | | | | | | | |
| Seed, \$/ac | \$0.00 | \$18.00 | \$45.41 | \$26.52 | \$20.00 | \$24.42 | \$8.00 | \$10.73 | \$19.80 | \$26.52 |
| Seeding rate, lbs/ac | 0.0 | 30.0 | 59.8 | 51.0 | 10.0 | 22.0 | 10.0 | 5.0 | 15.0 | 15.0 |
| Seed cost, \$/lb | \$0.00 | \$0.60 | \$0.76 | \$0.52 | \$2.00 | \$1.11 | \$0.80 | \$2.15 | \$1.32 | \$1.77 |
| Planting, \$/ac | \$13.73 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Herbicides | \$12.01 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 |
| Herbicide application | \$5.01 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Tillage | \$9.02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Disk, \$/ac | \$11.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chisel, \$/ac | \$8.95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Field cultivation, \$/ac | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$19.14 | \$15.50 | \$26.70 | \$30.81 | \$37.16 |
| Nitrogen removed | \$0.40 | \$0.00 | \$5.95 | \$6.53 | \$6.32 | \$10.30 | \$6.85 | \$4.90 | \$10.71 | \$12.92 |
| Phosphorus removed | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Harvesting | \$11.83 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Swathing, \$/ac | \$4.21 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sideraking, \$/ac | \$14.39 | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 |
| Baling, \$/ton | \$5.67 | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 |
| Hauling, \$/ton | | | | | | | | | | |
| Total Cost | \$25.99 | \$86.96 | \$123.79 | \$103.71 | \$115.08 | \$134.66 | \$102.25 | \$152.93 | \$162.18 | \$207.55 |
| FOLLOWING CROP | | | | | | | | | | |
| Change in expected yield, bu/ac | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Price, \$/bu | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 |
| Increased income, \$/ac | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Marginal cost, \$/bu | | | | | | | | | | |
| Nitrogen | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Phosphorus | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Harvesting | \$0.35 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Increased cost, \$/ac | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Net Returns to Forage Crop | -\$25.99 | -\$24.47 | -\$34.86 | -\$17.69 | \$12.56 | -\$8.64 | -\$7.33 | \$34.57 | \$7.53 | \$37.12 |
| Improvement from Control | xxx | \$1.52 | -\$8.86 | \$8.30 | \$38.55 | \$17.35 | \$18.66 | \$60.57 | \$33.52 | \$63.11 |
| Breakeven forage price, \$/ton | xxx | \$58.54 | \$65.98 | \$54.21 | \$41.88 | \$51.74 | \$48.20 | \$40.62 | \$48.15 | \$44.52 |
| Breakeven forage yield, tons/ac | xxx | 1.00 | 1.70 | 1.23 | 1.16 | 1.67 | 1.11 | 1.61 | 1.99 | 2.50 |

Table 4. Economics of Double-crop Summer Forages after Wheat -- KSU Hesston Experiment Field
Scenario #2: Nitrogen credit on some crops and impact on yield (positive or negative) for following crop

| | Double-crop Forage | | | | | | | | | |
|---------------------------------|--------------------|----------|----------|----------------|-----------|-----------|--------------|---------------|------------|----------------------|
| | Control | Cowpea | Soybean | Forage soybean | Sunn Hemp | Sunflower | Pearl millet | Grain sorghum | Sudangrass | Sorghum x sudangrass |
| INCOME | | | | | | | | | | |
| Yield, DM tons | 0.00 | 1.16 | 1.65 | 1.60 | 2.37 | 2.34 | 1.76 | 3.48 | 3.15 | 4.54 |
| Harvested yield, tons/ac | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 | 4.08 |
| Nitrogen credit, lbs | 0 | 17 | 25 | 24 | 36 | 0 | 0 | 0 | 0 | 0 |
| Forage price, \$/ton | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 |
| Income, \$/ac | \$0.00 | \$69.44 | \$98.82 | \$95.59 | \$141.84 | \$126.02 | \$94.92 | \$187.51 | \$169.71 | \$244.67 |
| COSTS | | | | | | | | | | |
| Seed, \$/ac | \$0.00 | \$18.00 | \$45.41 | \$26.52 | \$20.00 | \$24.42 | \$8.00 | \$10.73 | \$19.80 | \$26.52 |
| Seeding rate, lbs/ac | 0.0 | 30.0 | 59.8 | 51.0 | 10.0 | 22.0 | 10.0 | 5.0 | 15.0 | 15.0 |
| Seed cost, \$/b | \$0.00 | \$0.60 | \$0.76 | \$0.52 | \$2.00 | \$1.11 | \$0.80 | \$2.15 | \$1.32 | \$1.77 |
| Planting, \$/ac | \$13.73 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Herbicides | \$12.01 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 |
| Herbicide application | \$5.01 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Disk, \$/ac | \$9.02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chisel, \$/ac | \$11.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Field cultivation, \$/ac | \$8.95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nitrogen removed | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$19.14 | \$15.50 | \$26.70 | \$30.81 | \$37.16 |
| Phosphorus removed | \$0.40 | \$0.00 | \$5.95 | \$6.53 | \$6.32 | \$10.30 | \$6.85 | \$4.90 | \$10.71 | \$12.92 |
| Harvesting | \$11.83 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Swathing, \$/ac | \$4.21 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sideraking, \$/ac | \$14.39 | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 |
| Baling, \$/ton | \$5.67 | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 |
| Hauling, \$/ton | | | | | | | | | | |
| Total Cost | \$25.99 | \$86.96 | \$123.79 | \$103.71 | \$115.08 | \$134.66 | \$102.25 | \$152.93 | \$162.18 | \$207.55 |
| FOLLOWING CROP | | | | | | | | | | |
| Change in expected yield, bu/ac | 0.0 | 4.0 | 4.0 | 4.0 | 7.0 | -5.0 | 0.0 | -5.0 | -5.0 | -5.0 |
| Price, \$/bu | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 |
| Increased income, \$/ac | \$0.00 | \$9.60 | \$9.60 | \$9.60 | \$16.80 | -\$12.00 | \$0.00 | -\$12.00 | -\$12.00 | -\$12.00 |
| Marginal cost, \$/bu | | | | | | | | | | |
| Nitrogen | \$0.40 | \$0.00 | \$1.78 | \$1.78 | \$1.78 | \$3.11 | -\$2.22 | \$0.00 | -\$2.22 | -\$2.22 |
| Phosphorus | \$0.40 | \$0.00 | \$0.70 | \$0.70 | \$0.70 | \$1.22 | -\$0.87 | \$0.00 | -\$0.87 | -\$0.87 |
| Harvesting | \$0.35 | \$0.00 | \$1.40 | \$1.40 | \$1.40 | \$2.45 | -\$1.75 | \$0.00 | -\$1.75 | -\$1.75 |
| Increased cost, \$/ac | \$0.00 | \$3.88 | \$3.88 | \$3.88 | \$6.78 | -\$4.84 | \$0.00 | -\$4.84 | -\$4.84 | -\$4.84 |
| Net Returns to Forage Crop | -\$25.99 | -\$11.79 | -\$19.24 | -\$2.39 | \$36.77 | -\$15.80 | -\$7.33 | \$27.42 | \$0.37 | \$29.97 |
| Improvement from Control | xxx | \$14.20 | \$6.75 | \$23.60 | \$62.77 | \$10.20 | \$18.66 | \$53.41 | \$26.36 | \$56.96 |
| Breakeven forage price, \$/ton | xxx | \$53.04 | \$62.12 | \$50.22 | \$37.17 | \$55.14 | \$48.20 | \$42.91 | \$50.68 | \$46.28 |
| Breakeven forage yield, tons/ac | xxx | 0.69 | 1.31 | 0.84 | 0.56 | 1.85 | 1.11 | 1.79 | 2.17 | 2.68 |

↑ (Sunn hemp = \$47.86 and Sorg x sud = -\$4.98 when N = \$0.80/lb)

Table 5. Economics of Double-crop Summer Forages after Wheat -- KSU Hesston Experiment Field
Scenario #3: No nitrogen credit for legumes & no impact on yield of following crop -- reduce forage yield by 25% (i.e., crop failure)

| | Double-crop Forage | | | | | | | | | |
|---------------------------------|--------------------|----------|----------|----------------|-----------|-----------|--------------|---------------|------------|----------------------|
| | Control | Cowpea | Soybean | Forage soybean | Sunn Hemp | Sunflower | Pearl millet | Grain sorghum | Sudangrass | Sorghum x sudangrass |
| INCOME | | | | | | | | | | |
| Yield, DM tons | 0.00 | 0.87 | 1.24 | 1.20 | 1.78 | 1.75 | 1.32 | 2.61 | 2.32 | 3.40 |
| Harvested yield, tons/ac | 0.00 | 0.78 | 1.11 | 1.08 | 1.60 | 1.58 | 1.19 | 2.34 | 2.12 | 3.06 |
| Nitrogen credit, lbs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Forage price, \$/ton | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 |
| Income, \$/ac | \$0.00 | \$48.87 | \$66.70 | \$64.52 | \$95.73 | \$94.52 | \$71.19 | \$140.63 | \$127.28 | \$183.51 |
| COSTS | | | | | | | | | | |
| Seed, \$/ac | \$0.00 | \$18.00 | \$45.41 | \$26.52 | \$20.00 | \$24.42 | \$8.00 | \$10.73 | \$19.80 | \$26.52 |
| Seeding rate, lbs/ac | 0.0 | 30.0 | 59.8 | 51.0 | 10.0 | 22.0 | 10.0 | 5.0 | 15.0 | 15.0 |
| Seed cost, \$/b | \$0.00 | \$0.60 | \$0.76 | \$0.52 | \$2.00 | \$1.11 | \$0.80 | \$2.15 | \$1.32 | \$1.77 |
| Planting, \$/ac | \$13.73 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Herbicides | \$12.01 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 | \$5.52 |
| Herbicide application | \$5.01 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Disk, \$/ac | \$9.02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chisel, \$/ac | \$11.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Field cultivation, \$/ac | \$8.95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nitrogen removed | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$14.36 | \$11.62 | \$20.03 | \$22.96 | \$27.87 |
| Phosphorus removed | \$0.40 | \$0.00 | \$4.46 | \$4.90 | \$4.74 | \$7.72 | \$5.14 | \$3.68 | \$8.03 | \$9.69 |
| Harvesting | \$11.83 | 0 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| Swathing, \$/ac | \$4.21 | 0 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| Sideraking, \$/ac | \$14.39 | 0.00 | 0.78 | 1.11 | 1.08 | 1.60 | 1.58 | 1.19 | 2.34 | 2.12 |
| Baling, \$/ton | \$5.67 | 0.00 | 0.78 | 1.11 | 1.08 | 1.60 | 1.58 | 1.19 | 2.34 | 2.12 |
| Hauling, \$/ton | | | | | | | | | | |
| Total Cost | \$25.99 | \$76.24 | \$110.71 | \$90.93 | \$97.83 | \$113.62 | \$85.21 | \$123.90 | \$133.11 | \$168.82 |
| FOLLOWING CROP | | | | | | | | | | |
| Change in expected yield, bu/ac | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Price, \$/bu | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 |
| Increased income, \$/ac | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Marginal cost, \$/bu | | | | | | | | | | |
| Nitrogen | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Phosphorus | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Harvesting | \$0.35 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Increased cost, \$/ac | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| Net Returns to Forage Crop | -\$25.99 | -\$29.37 | -\$44.02 | -\$26.42 | -\$2.10 | -\$19.11 | -\$14.02 | \$16.73 | -\$5.83 | \$14.69 |
| Improvement from Control | xxx | -\$3.38 | -\$18.02 | -\$0.42 | \$23.89 | \$6.89 | \$11.97 | \$42.72 | \$20.17 | \$40.68 |
| Breakeven forage price, \$/ton | xxx | \$64.33 | \$76.21 | \$60.39 | \$45.03 | \$55.63 | \$49.91 | \$41.77 | \$50.49 | \$46.70 |
| Breakeven forage yield, tons/ac | xxx | 0.87 | 1.56 | 1.09 | 1.00 | 1.40 | 0.89 | 1.27 | 1.62 | 2.04 |

↑

Table 6. Economics of Double-crop Summer Forages after Wheat -- KSU Hesston Experiment Field
Scenario #4: N credit on some crops and impact on yield (+/-) for following crop -- increase all costs by 25% (except fertilizer removal)

| | Double-crop Forage | | | | | | | | | |
|---------------------------------|--------------------|----------|----------|----------------|-----------|-----------|--------------|---------------|------------|----------------------|
| | Control | Cowpea | Soybean | Forage soybean | Sunn Hemp | Sunflower | Pearl millet | Grain sorghum | Sudangrass | Sorghum x sudangrass |
| INCOME | | | | | | | | | | |
| Yield, DM tons | 0.00 | 1.16 | 1.65 | 1.60 | 2.37 | 2.34 | 1.76 | 3.48 | 3.15 | 4.54 |
| Harvested yield, tons/ac | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 | 4.08 |
| Nitrogen credit, lbs | 0 | 17 | 25 | 24 | 36 | 0 | 0 | 0 | 0 | 0 |
| Forage price, \$/ton | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 | \$60.00 |
| Income, \$/ac | \$0.00 | \$69.44 | \$98.82 | \$95.59 | \$141.84 | \$126.02 | \$94.92 | \$187.51 | \$169.71 | \$244.67 |
| COSTS | | | | | | | | | | |
| Seed, \$/ac | \$0.00 | \$22.50 | \$56.76 | \$33.15 | \$25.00 | \$30.53 | \$10.00 | \$13.41 | \$24.75 | \$33.15 |
| Seeding rate, lbs/ac | 0.0 | 30.0 | 59.8 | 51.0 | 10.0 | 22.0 | 10.0 | 5.0 | 15.0 | 15.0 |
| Seed cost, \$/b | \$0.00 | \$0.75 | \$0.95 | \$0.65 | \$2.50 | \$1.39 | \$1.00 | \$2.68 | \$1.65 | \$2.21 |
| Planting, \$/ac | \$17.16 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Herbicides | \$15.01 | \$6.90 | \$6.90 | \$6.90 | \$6.90 | \$6.90 | \$6.90 | \$6.90 | \$6.90 | \$6.90 |
| Herbicide application | \$6.26 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Disk, \$/ac | \$11.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chisel, \$/ac | \$13.99 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Field cultivation, \$/ac | \$11.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nitrogen removed | \$0.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$19.14 | \$15.50 | \$26.70 | \$30.81 | \$37.16 |
| Phosphorus removed | \$0.40 | \$0.00 | \$5.95 | \$6.53 | \$6.32 | \$10.30 | \$6.85 | \$4.90 | \$10.71 | \$12.92 |
| Harvesting | \$14.79 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Swathing, \$/ac | \$5.26 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sideraking, \$/ac | \$17.99 | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 |
| Baling, \$/ton | \$7.08 | 0.00 | 1.04 | 1.48 | 1.43 | 2.13 | 2.10 | 1.58 | 3.13 | 2.83 |
| Hauling, \$/ton | | | | | | | | | | |
| Total Cost | \$37.48 | \$126.90 | \$175.55 | \$150.21 | \$167.78 | \$188.16 | \$145.80 | \$214.56 | \$222.74 | \$283.88 |
| FOLLOWING CROP | | | | | | | | | | |
| Change in expected yield, bu/ac | 0.0 | 4.0 | 4.0 | 4.0 | 7.0 | -5.0 | 0.0 | -5.0 | -5.0 | -5.0 |
| Price, \$/bu | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 | \$2.40 |
| Increased income, \$/ac | \$0.00 | \$9.60 | \$9.60 | \$9.60 | \$16.80 | -\$12.00 | \$0.00 | -\$12.00 | -\$12.00 | -\$12.00 |
| Marginal cost, \$/bu | | | | | | | | | | |
| Nitrogen | \$0.40 | \$0.00 | \$1.78 | \$1.78 | \$1.78 | \$3.11 | -\$2.22 | \$0.00 | -\$2.22 | -\$2.22 |
| Phosphorus | \$0.40 | \$0.00 | \$0.70 | \$0.70 | \$0.70 | \$1.22 | -\$0.87 | \$0.00 | -\$0.87 | -\$0.87 |
| Harvesting | \$0.35 | \$0.00 | \$1.40 | \$1.40 | \$1.40 | \$2.45 | -\$1.75 | \$0.00 | -\$1.75 | -\$1.75 |
| Increased cost, \$/ac | \$0.00 | \$3.88 | \$3.88 | \$3.88 | \$6.78 | -\$4.84 | \$0.00 | -\$4.84 | -\$4.84 | -\$4.84 |
| Net Returns to Forage Crop | -\$37.48 | -\$51.74 | -\$71.01 | -\$48.89 | -\$15.92 | -\$69.29 | -\$50.87 | -\$34.21 | -\$60.18 | -\$46.36 |
| Improvement from Control | xxx | -\$14.25 | -\$33.52 | -\$11.41 | \$21.56 | -\$31.81 | -\$13.39 | \$3.27 | -\$22.70 | -\$8.88 |
| Breakeven forage price, \$/ton | xxx | \$80.36 | \$89.29 | \$74.63 | \$56 | | | | | |



Summary...

- Current projected crop budgets for central KS look reasonably favorable for 2010
- Rotation has a bigger impact on returns than tillage
- Returns with tillage slightly better than no-till given study assumptions (machinery costs will vary considerably between operations)
- Returns similar for rotations including combinations of W, GS, SB, and C – rotations including sunflowers and continuous sorghum had lowest returns
- Cover crops (forage soybean and sunn hemp) reduce N requirements and provide yield benefit, but benefits are not large enough to offset establishment costs



The screenshot shows the AgManager.info website with a navigation menu on the left and a main content area. A purple box with the text "Questions?" is overlaid on the bottom center of the page. On the right side, there is a box with contact information for Kevin Dhuyvetter.

Questions?

Kevin Dhuyvetter
785-532-3527
kcd@ksu.edu