Assumptions and Definitions used in Budgets

A budget is used to estimate the net returns per crop acre. The inputs that go into a budget can be in various forms as seen on the input column. These include bu-bushels, lb-pounds, qt-quarts, oz-ounces, 1K-one thousand seeds, acres, Ac-in, and Mcf.

1. Definitions
    a. **Ac-in** – acre inch. Used in irrigation to represent one inch of water applied to one acre. This is equivalent to 2,715 gallons of water.
    b. **Mcf** – an abbreviation denoting a thousand cubic feet of natural gas.
    c. **N, P, and K** – Nitrogen, Phosphorous, and Potassium

2. Sources of information
    a. Seeds, fertilizer, herbicides, and insecticides
        i. Most of the Pesticide and seed prices come from a custom survey of input suppliers conducted by the Agricultural Economics Department at Kansas State University
        ii. A secondary source of pesticides is the "2016 Chemical Weed Control" guide produced by K-State Research and Extension http://www.morton.k-state.edu/crops-livestock/CHEMWEEDGUIDE2016.pdf
        iii. Fertilizer prices come from the statewide average of DTN fertilizer prices

    b. Custom rates
        i. The main source of custom rates is from a survey conducted every few years. NASS conducted a survey in 2013 and the Agricultural Economics Department at Kansas State University is conducting a survey in 2016. These surveys are used to develop a model of custom rates that is a function of fuel prices an index of machinery prices. This way, custom rates can be estimated for years outside of a survey. The Agricultural Economics Department at Kansas State University publishes the yearly estimates of custom rates at http://www.agmanager.info/sites/default/files/CustomRates_2016_0.pdf
        ii. A secondary source of custom rates comes from Iowa State University https://store.extension.iastate.edu/Product/2016-Iowa-Farm-Custom-Rate-Survey

    c. Grain prices – Dan O'Brien at Kansas State University provides these estimates based on the following assumptions for the October 1 revision of the budgets
        i. Alfalfa - Northwest KS -- "Good" Quality Alfalfa Hay (large round bales) = $75-$85 / ton, with Stock Cow Alfalfa (fair/good quality) = $100-$110. Overall average = $92.50 /ton USDA NASS 9/20/2016 report = DC_GR3100

ii. Alfalfa - South Central KS -- "Good" Quality Alfalfa Hay = $95-$135 / ton, with Stock or Dry Cow Alfalfa = $100-$120. Overall average = $112.50 /ton; USDA NASS 9/20/2016 report = DC_GR3100
iii. Alfalfa - Southeast KS -- "Good" Quality Alfalfa Hay = $75-$85 / ton, with Stock or Dry Cow Alfalfa = $100-$110. Overall average = $92.50 /ton; USDA NASS 9/20/2016 report = DC_GR3100
iv. Alfalfa - Southwest KS -- "Good" Quality Alfalfa Hay = $120-$150 / ton, with Stock or Dry Cow Alfalfa = $80-$100. Overall average = $112.50 /ton; USDA NASS 9/20/2016 report = DC_GR3100
v. Alfalfa - Western KS -- Average of NW & SW Kansas ($92.50 + $112.50 = $102.50 /ton; USDA NASS 9/20/2016 report = DC_3100
vi. Canola - South Central KS -- New Crop Canola bid on 9/22/2016 reported in Oklahoma, https://www.ams.usda.gov/mnreports/ok_gr110.txt
vii. Corn - North Central KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.3353 /bu) for Concordia KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.4222 / bu
viii. Corn - Northeast KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.1608 /bu) for Topeka KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.5967 / bu
ix. Corn - Northwest KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.0567 /bu) for Colby KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.7008 / bu
x. Corn - South Central KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.1123 /bu) for Hutchinson KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.6453 / bu
xi. Corn - Southeast KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.3860 /bu) for Columbus KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.3716 / bu
xii. Corn - Southwest KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (+$0.1490 /bu) for Garden City KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.9065 / bu
xiii. Corn Silage - Northeast KS -- By formula, 8.5 x Price of Corn in NE Kansas ($3.70 / bu) = $31.45 per ton
xiv. Corn Silage - Western KS -- By formula, 8.5 x Average Price of Corn in Western Kansas (i.e., average of NW ($3.70) & SW ($3.91) = 8.5 x $3.805 / bu = $32.34 per ton
xv. Cotton - South Central and Southeast KS -- New Crop Cotton bid on 9/22/2016 reported in Oklahoma, https://www.ams.usda.gov/mnreports/ok_gr110.txt
xvi. Cotton - Southwest KS -- New Crop Cotton bid on 9/22/2016 reported in Oklahoma, https://www.ams.usda.gov/mnreports/ok_gr110.txt

xvii. Dry Edible Beans -- Current cash bids for pinto & great northern dry edible beans on 9/23/2016 for Colorado-Nebraska from https://www.ams.usda.gov/mnreports/gl_gr510.txt

xviii. Fescue Hay -- Large round bales of fescure hay = $20-$30 / ton, with Stock or Dry Cow Alfalfa = $80-$140. Overall average = $112.50 /ton (Using SW KS prices - NW KS not directly available); USDA NASS 9/20/2016 report = DC_GR3100

xix. Forage Sorghum Hay -- Could not find a price on 9/23/2016 for forage sorghum hay (likely none available yet). So, use the 2016 ratio of Forage Sorghum Hay to the avg. Forage Sorghum Silage price between SC ($25.30) & Western ($25.84) (equal to $25.57) times 2.72 (i.e., the 2015 ratio) to get = $69.55 / ton

xx. Forage Sorghum Silage - South Central KS -- Calculated as 0.80 x SC Kansas corn silage price (= 8.5 x SC KS Corn price), = 0.8 x (8.5 x $3.72) = $25.296 / ton

xxi. Forage Sorghum Silage - Western KS -- Calculated as 0.80 x Western Kansas corn silage price (= 8.5 x Western KS Corn price), = 0.8 x (8.5 x (($3.70 + $3.90)/2)) = $25.84 / ton

xxii. Grain Sorghum - North Central KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.3100 /bu) for Concordia KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.4475 / bu

xxiii. Grain Sorghum - Northeast KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.2603 /bu) for Topeka KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.4972 / bu

xxiv. Grain Sorghum - Northwest KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.2709 /bu) for Colby KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.4867 / bu

xxv. Grain Sorghum - South Central KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.0982 /bu) for Hutchinson KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.6594 / bu

xxvi. Grain Sorghum - Southeast KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.6998 /bu) for Columbus KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.0577 / bu

xxvii. Grain Sorghum - Southwest KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.3797 /bu) for Garden City KS adjusted off of $3.7575 /bu DEC 2017 CME Corn Futures on 9/23/2016 = $3.3778 / bu

xxviii. Grain Sorghum - Western KS -- Average of NW & SW Kansas (($3.42 + $3.40)/2) = $3.41 /bu

xxix. Soybeans - North Central KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.6136 /bu) for Concordia KS adjusted off of $9.4925 /bu NOV 2017 CME Soybean Futures on 9/23/2016 = $8.8789 / bu

xxx. Soybeans - Northeast KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.4929 /bu) for Topeka KS adjusted off of $9.4925 /bu NOV 2017 CME Soybean Futures on 9/23/2016 = $9.000 / bu

xxxi. Soybeans - Northwest KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.8771 /bu) for Colby KS adjusted off of $9.4925 /bu NOV 2017 CME Soybean Futures on 9/23/2016 = $8.6155 / bu

xxxii. Soybeans - South Central KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.4412 /bu) for Hutchinson KS adjusted off of $9.4925 /bu NOV 2017 CME Soybean Futures on 9/23/2016 = $9.0513 / bu

xxxiii. Soybeans - Southeast KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.5853 /bu) for Columbus KS adjusted off of $9.4925 /bu NOV 2017 CME Soybean Futures on 9/23/2016 = $8.9072 / bu

xxxiv. Soybeans - Southwest KS -- Weeks 36-39 Harvest time basis average of the 3-Yr average (-$0.8637 /bu) for Garden City KS adjusted off of $9.4925 /bu NOV 2017 CME Soybean Futures on 9/23/2016 = $8.6288 / bu

xxxv. Soybeans - Western KS -- Average of NW & SW Kansas (($8.62 + $8.63)/2) = $8.43 /bu

xxxvi. Sunflower (Confectionary) - Western KS -- Weighted average of 65% Large seed ($24.00 /cwt) plus 35% Small seed ($14.00 /cwt), equaling $20.40 per cwt (from 9/23/2016 https://www.ams.usda.gov/mnreports/dc_gr111.txt)

xxxvii. Sunflower (Oil-type) - NC and NE -- Current forward contract bids in Central & Northern Kansas (from 9/23/2016 https://www.ams.usda.gov/mnreports/dc_gr111.txt)

xxxviii. Sunflower (Oil-type) - Western KS -- Average of new crop 2016 Nusun (mid oleic) ($18.60 /cwt) and high Oleic ($16.60) bids at Goodland, KS (from 9/23/2016 https://www.ams.usda.gov/mnreports/dc_gr111.txt)

xxxix. Wheat - North Central KS -- Weeks 24-27 Harvest time basis average of the 3-Yr average (-$0.8059 /bu) for Concordia KS adjusted off of $4.71 /bu SEPT 2017 CME KS HRW Wheat Futures on 9/23/2016 = $3.9041 / bu

xl. Wheat - Northeast KS -- Weeks 24-27 Harvest time basis average of the 3-Yr average (-$0.6860 /bu) for Topeka KS adjusted off of $4.71 /bu SEPT 2017 CME KS HRW Wheat Futures on 9/23/2016 = $4.0240 / bu

xli. Wheat - Northwest KS -- Weeks 24-27 Harvest time basis average of the 3-Yr average (-$0.9470 /bu) for Colby KS adjusted off of $4.71 /bu SEPT 2017 CME KS HRW Wheat Futures on 9/23/2016 = $3.7633 / bu

xlii. Wheat - South Central KS -- Weeks 24-27 Harvest time basis average of the 3-Yr average (-$0.6709 /bu) for Hutchinson KS adjusted off of $4.71 /bu SEPT 2017 CME KS HRW Wheat Futures on 9/23/2016 = $4.0391 / bu

xliii. Wheat - Southeast KS -- Weeks 24-27 Harvest time basis average of the 3-Yr average (-$0.9759 /bu) for Columbus KS adjusted off of $4.71 /bu SEPT 2017 CME KS HRW Wheat Futures on 9/23/2016 = $3.7341 / bu

xliv. Wheat - Southwest KS -- Weeks 24-27 Harvest time basis average of the 3-Yr average (-$0.9384 /bu) for Garden City KS adjusted off of $4.71 /bu SEPT 2017 CME KS HRW Wheat Futures on 9/23/2016 = $3.7716 / bu

xlv. Wheat - Western KS -- Average of NW & SW Kansas (($3.76 + $3.77)/2) = $3.765 /bu

xlvi. -- Crop prices for corn silage, sorghum (cane) silage, and cane hay are based on location-specific grain prices listed above. $/T corn silage = 8.5 x $/bu corn price; $/T sorghum silage = 0.8 x $/T corn silage; $/T cane hay = (8/3) x $/T sorghum silage.

d. Crop yields – Historical (30-year) NASS crop yields for the 9 crop reporting districts are used to develop a trend line of yields. Yields less than 75% of the trend line are dropped from the model as expectations for the coming year are for yields to average or above average

e. Crop insurance – These costs are calculated from RMA reported costs (less buyer subsidy) for policies at a 75% or greater coverage level. Last year's values were used as reported by the RMA

f. Cash rents – Are based on the National Agricultural Statistics Service (NASS) reported cash rents for the budget regions last year. Separate rates are reported for non-irrigated and irrigated land. https://quickstats.nass.usda.gov

3. Irrigation Assumptions
   a. 125 acres in a crop circle

   b. Center pivot systems are used

   c. Natural gas is the source of power

d. Western irrigation systems are similar and so are the central systems for purposes of generating a crop budget. Different crops have different water level assumptions though.

e. Machinery costs and well depths
    i. Common to state (both Western and Central Kansas – Center pivot
        1. Cost - $93,461
        2. Useful life – 25 years
        3. Salvage value 25% of purchase price

    ii. Western Kansas
        1. Power unit and meter
            a. Cost - $15,398
            b. Useful life – 7 years
            c. No salvage value

        2. Well, pump, and gearhead
            a. Cost - $114,508
            b. Useful life – 25 years
            c. No salvage value
            d. Pressure of well – 20 PSI
            e. Lift – 300 feet

        3. Other factors
            a. Labor use rate - $5 per inch (entire circle)
            b. Repair and maintenance - $41.25 per inch (entire circle)

    iii. Central Kansas
        1. Power unit and meter
            a. Cost - $8,647
            b. Useful life – 7 years
            c. No salvage value

        2. Well, pump, and gearhead
            a. Cost - $76,577
            b. Useful life – 25 years
            c. No salvage value
            d. Pressure of well – 20 PSI
            e. Lift – 150 feet

        3. Other factors
            a. Labor use rate - $5 per inch (entire circle)
            b. Repair and maintenance - $41.25 per inch (entire circle)

f. Pumping costs – K-State has a spreadsheet to calculate the irrigation cost for various fuels and length of lift - http://www.agmanager.info/ksu-irrigation-energy-cost

4. Budget combinations – Wheat budgets in western Kansas that include fallow in the rotation have the fallow part of the costs included with the wheat budget (i.e., any tillage and herbicides practices during the fallow year are part of the wheat budget)/

5. Calculations
    a. Depreciation – Straightline (i.e., purchase price minus salvage value divided by the years of use.

    b. Repair and maintenance – based on historical costs, expert opinion, and engineering formulas

    c. Interest
        i. Variable costs – typically it is assumed that variable costs of production require a commitment of funds for six months (i.e., planting to harvest). Thus the interest charge for these costs is half a year. If a farmer borrows these operating funds, then he or she will see this cost directly in the form of an interest expense. Even if farmers use their own funds, there is still an opportunity cost as those funds could have been used elsewhere.

        ii. Fixed costs – Similar to the variable costs except these assets have dollars committed over the whole year and not just 6 months. The calculation is a bit different as well. Every year the asset value depreciates so the farmer has less dollars tied up in the asset. The typical way of accounting for this changing asset value is to calculate the average asset value in any given year (i.e. purchase price + salvage value and then divide by 2). This average asset value is then multiplied by the interest rate to get an interest charge to fixed assets.