ADJUSTED GROSS REVENUE-LITE ON BEEF FARMS
Model Documentation

APPENDIX

To accompany the article:

Jeffery R. Williams, Professor, Department of Agricultural Economics
Andrew T. Saffert, Former Research Assistant, Department of Agricultural Economics
G. Art Barnaby, Professor, Department of Agricultural Economics
Richard V. Llewelyn, Extension Assistant, Department of Agricultural Economics
Kansas State University
Michael R. Langemeier, Professor, Department of Agricultural Economics
Purdue University

Corresponding Author:
Jeffery R. Williams
Department of Agricultural Economics
342 Waters Hall
Kansas State University
Manhattan, KS 66506-4011
Voice: 785-532-4491
Fax: 785-532-6925
E-mail:jwilliam@k-state.edu

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Appendix A

Model Documentation

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AGR-Lite Mathematical Derivation

The following equations outline the mathematical derivation of the AGR-Lite contract. These equations have been constructed to conform to AGR-Lite handbook guidelines and procedures (USDA, 2010). Subsequently, these equations were used to estimate AGRC and NFI distributions with and without participation in the AGR-Lite program as a stand-alone product.

(A1) $\boldsymbol{AFI_{kj}} = \sum$ *Schedule F (year 2011 form, lines 1e, 2b, 3b, 5a, 5c, 8b)*

       AFI_{kj} Allowable Farm Income for insurance year k = 0 for farm j

                      AFI is farm income from the production of insurable agricultural commodities minus added value for any agricultural commodity due to post-production operations such as processing, packing, packaging, etc., that the IRS requires producers to report.

       k Years, for k = -6,-5,-4,-3,-2

                      Individuals must produce five consecutive years of IRS Form 1040, Schedule F filings or equivalent tax forms beginning prior to the year immediately proceeding the insurance year. (For 2010 insurance year, submit Schedule F filings for 2008, 2007, 2006, 2005, and 2004)

(A2) $\boldsymbol{AGRA_{kj}} = \sum\limits_{k=-6}^{-2} (AFI_{kj}) / 5$

       $AGRA_{kj}$ Adjusted Gross Revenue 5-Year Average for insurance year k = 0 for farm j

(A3) $\boldsymbol{IITF_{kj}} = MAX\{((\sum\limits_{k=-6}^{-3} MAX\{MIN\{(AFI_{k+1j} / AFI_{kj}), 1.200\}, 0.800\}) / 4)^{4}, 1.000\}$

       $IITF_{kj}$ Income Indexing Trend Factor for insurance year k = 0 for farm j

The annual indexing is capped (1.200) and cupped (0.800). Refer to the example below for indexing AGR. The resulting income indexing trend factor is cupped (1.000). Values below 1.000 will not result in indexing and as such, the guarantee will be based on the lesser of AGRA and EI.

(A4) $\boldsymbol{IAGR_{kj}} = IF(\,AND(\,MAX\{\,AFI_{k-2j}, AFI_{k-3j}\,\}, EI_{kj}\,) > AGRA_{kj}, IITF_{kj} \times AGRA_{kj}, AGRA_{kj}\,)$

$IAGR_{kj}$ Indexed Adjusted Gross Revenue for insurance year k = 0 for farm j

If one of the two most recent tax year's allowable income in the 5-year base period and the expected income for the current insurance year (Item 8 of the Intended Agricultural Commodity Report) in the Annual Farm Report exceeds the 5-year average the individual qualifies for indexing.

EI_{kj} Expected Income for year insurance k = 0 for farm j at time of application. Expected Income reflects the expected income from commodities to be produced (Item 8 of the Intended Agricultural Commodity Report) in the Annual Farm Report, filed prior to each insurance year as part of the application process.

(A5) $\boldsymbol{AAGR_{kj}} = MIN(IAGR_{kj}, EI_{kj})$

$AAGR_{kj}$ Approved Adjusted Gross Revenue for insurance year k = 0 for farm j

(A6) $\boldsymbol{AGRL_{kj}} = (AAGR_{kj} \times CL_{kj} \times PR_{kj}) \leq ML_{kj}$

$AGRL_{kj}$ Adjusted Gross Revenue Liability for insurance year k = 0 for farm j

CL_{kj} Coverage Level (65%, 75%, 80% of adjusted gross revenue) selected by farmer for insurance year k = 0 for farm j

PR_{kj} Payment Rate (75% and 90% for each coverage level) selected for insurance year k = 0 for farm j

65/75, 65/90, 75/75, 75/90 Everyone qualifies (One crop requirement)

80/75, 80/90 Three crop requirement. To qualify for 80% coverage

levels, the individual must indicate on the Intended Agricultural

Commodity report that at least three commodities will be produced,

the income of which will result in a value greater than or equal to that

determined by the diversification formula.

ML_{kj} — Maximum Liability of \$1,000,000 for insurance year k = 0 for farm j

(A7) $AE_{kj} = \sum$ *Schedule F (year 2011 form, lines 1d, 10-14, 16-20, 22, 25-28, 30-32)*

AE_{kj} — Allowable Expenses (Schedule F) for insurance year k = 0 for farm j

Only expenses directly associated with the production of insurable

agricultural commodities are allowable. Indirect expenses must be

excluded.

If individual qualified for indexing and the income trend factor was

greater than one, then expenses must be indexed accordingly as

prescribed by the contract.

(A8) $AEA_{kj} = \sum\limits_{k=-6}^{-2} (AE_{kj}) / 5$

AEA_{kj} — Allowable Expenses 5-Year Average for insurance year k = 0 for farm j

(A9) $EITF_{kj} = MAX\{((\sum\limits_{k=-6}^{-3} MAX\{ MIN\{(AE_{k+1j} / AE_{kj}),1.200 \}0.800 \}) / 4)^4 ,1.000 \}$

$EITF_{kj}$ — Expense Indexing Trend Factor for insurance year k = 0 for farm j

The annual indexing is capped (1.200) and cupped (0.800). The

resulting expense indexing trend factor is cupped (1.000). Values

below 1.000 will not result in indexing and as such the guarantee will

be based on AEA. Refer to the example below for indexing AEA.

(A10) $IAE_{kj} = IF (AND (MAX \{ AFI_{k-2} , AFI_{k-3} \}, EI_{kj}) > AGRA_{kj} , EITF_{kj} \times AEA_{kj} , AEA_{kj})$

IAE_{kj} Indexed Allowable Expenses for insurance year k = 0 for farm j

If an individual performed income indexing, similar procedures must be implemented to 5-year average expenses (AEA). IAE will be used conditional on the following provisions: 1) Income indexing was conducted; and 2) Conditions triggering "Factor Up" did not exist. Refer to the example below for indexing and equation A11 which illustrates factoring up and down.

(A11) $\boldsymbol{FAE_{kj}} = IF(IAGR_{kj} > AAGR_{kj} > AGRA_{kj}), AEA_{kj} \times (AAGR_{kj} / AGRA_{kj}), IAE_{kj})$

$\boldsymbol{FAE_{kj}} = IF(AAGR_{kj} < AGRA_{kj}, AEA_{kj} \times (AAGR_{kj} / AGRA_{kj}), AEA_{kj})$

FAE_{kj} Factored Allowable Expenses for insurance year k = 0 for farm j

AEA will be factored up or down conditional on the following provisions: When Indexed AGR (IAGR) > Approved AGR (AAGR) > 5-year average AGR (AGRA), AEA is "Factored Up" taking the product of AEA and the ratio of Approved AGR (AAGR) to 5-year Average AGR (AGRA). When Approved AGR (AAGR) < 5-year Average AGR (AGRA), AEA is "Factored Down" by taking the product of AEA and the ratio of Approved AGR (AAGR) to 5-year Average AGR (AGRA)

(A12) $\boldsymbol{AAE_{kj}} = FAE_{kj}$

AAE_{kj} Approved Allowable Expenses for insurance year k = 0 for farm j

Indemnity Calculation

(A13) $\boldsymbol{PEP_{kj}} = (AE_{kj} + \Delta AP_{kj} + \Delta PE_{kj})/ AAE_{kj}$

PEP_{kj} Production Expense Percentage for insurance year k = 0 for farm j

ΔAP_{kj} Change in Accounts Payable for insurance year k = 0 for farm j

Accrual adjustments will occur in AE by the change (increase or decrease) in AP (ending – beginning accounts payable). To ensure accurate allocation of expenses, AP are added back. When AP increases (goods and services received but not yet paid for) AE will increase by the net change. Thus, the associated costs are included in current insurance year.

ΔPE_{kj} Change in Prepaid Expenses for insurance year k = 0 for farm j

Accrual adjustments will occur in AE by the change (increase or decrease) in PE (beginning – ending prepaid expenses). To ensure the allocation of expenses to the applicable period, PE are added back. When PE increases (goods and services paid for but not yet received) AE will decrease, because goods and services are deferred until the following period.

(A14) $\textbf{ERP}_{\textbf{kj}} = MAX\ (70\% - PEP_{kj},\ 0)$

ERP_{kj} Expense Reduction Percentage for insurance year k = 0 for farm j

If Allowable Expenses (AE) for the insurance year are less than 70% of the Approved Allowable Expenses (AAE), the approved AGR (AAGR) will be reduced 0.1% for each 0.1% the allowable expenses (AE) for the insurance year falls below 70% of the Approved Allowable Expenses (AAE).

(A15) $\textbf{ER}_{\textbf{kj}} = ERP_{kj}\ x\ AAGR_{kj}$

ER_{kj} Expense Reduction for insurance year k = 0 for farm j

If Allowable Expenses (AE) fall below 70% of Approved Allowable Expenses (AAE) (determined in equation A14), Approved AGR

(AAGR) will be reduced by ER, proportional to the reduction

observed in AAE established for the current insurance year.

(A16) **$ADJAAGR_{kj} = AAGR_{kj} - ER_{kj}$**

    ADJAAGRj   Adjusted Approved AGR for insurance year k = 0 for farm j

                             Approved AGR will be reduced by the value determined in equation

                             15, to reflect the proportional change in AAE. This result will then be

                             used in establishing the guarantee level.

(A17) **$AGRLIP_{kj} = ADJAAGR_{kj} \times CL_{kj}$**

    $AGRLIP_{kj}$ AGR Loss Inception Point for insurance year k = 0 for farm j

(A18) **$AGRC_{kj} =$** $AFI_{kj} + \Delta AR_{kj} + \Delta IN_{kj} + NAP_{kj} + NGCH_{kj} + GCIIP_{kj} + SPIK_{kj} + MO_{kj}$

    $AGRC_{kj}$ Adjusted Gross Revenue to Count for insurance year k = 0 for farm j

    AFI_{kj}   Allowable Farm Income for insurance year k = 0 for farm j at time of

                 filing

    ΔAR_{kj}   Change in Accounts Receivable for insurance year k = 0 for farm j

                 The adjustment is plus or minus the difference between the dollar

                 amount of the beginning and ending accounts receivable.

    ΔIN_{kj}   Change in crop and livestock Inventory for insurance year k = 0 for farm j

                 The adjustment is plus or minus the change in value of the beginning

                 and ending inventories for crops and livestock.

    NAP_{kj}   Noninsured Crop Disaster Assistance Program Payments for insurance

                 year k = 0 for farm j

    $NGCH_{kj}$ Net Gain from Commodity Hedges for insurance year k = 0 for farm j

    $GCIIP_{kj}$ Gross Crop Insurance Indemnity Payments for insurance year k = 0 for

                 farm j

Include payments from APH, CRC, RA, GRP, GRIP, LRP, LGM, Private Hail, Mortality or any other product offered under the authority of the ACT including applicable premiums.

$SPIK_{kj}$ Sugarbeet – Payment in Kind for insurance year k = 0 for farm j

MO_{kj} Marketing Orders – cranberry, tart cherries for insurance year k = 0 for farm j

(A19) $RD_{kj} = MAX(AGRLIP_{kj} - AGRC_{kj}, 0)$

RD_{kj} Revenue Deficiency for insurance year k = 0 for farm j

(A20) $ID_{kj} = RD_{kj} \; x \; PR_{kj}$

ID_{kj} Indemnity Payment for insurance year k = 0 for farm j

(A21) $APR_{yj} = \sum\limits_{y=1999}^{2010} \sum\limits_{j=1}^{N} ID_{yj} \; / \; \sum\limits_{y=1999}^{2010} \sum\limits_{j=1}^{N} AGRL_{yj}$

APR_{yj} Average Premium Rate for farms with Indemnity where y equals the years in which the farm enrolled (1999-2010) in AGR-Lite, j equals the 1 to N farms.

(A22) $NFI_{yj} = (VFP_{yj} - COE_{yj} - DP_{yj} - AIE_{yj}) - (CIP_{yj} + CIPE_{yj} - CIPB_{yj}) + CIE_{yj}$

VFP_{yj} Value of Farm Production for years y = 1999 to 2010 for farm j

COE_{yj} Cash Operating Expenses for years y = 1999 to 2010 for farm j

DP_{yj} Depreciation for years y = 1999 to 2010 for farm j

AIE_{yj} Accrued Income-Expense adjustment for years y = 1999 to 2010 for farm j

CIP_{yj} Crop Insurance Proceeds for years y = 1999 to 2010 for farm j

$CIPE_{yj}$ Crop Insurance Proceeds Ending value for years y = 1999 to 2010 for farm j

$CIPB_{yj}$ Crop Insurance Proceeds Beginning Value for years y = 1999 to 2010 for farm j

CIE_{yj} Crop Insurance Expense (accrual) for years y = 1999 to 2010 for farm j

(A23) $\boldsymbol{NFIAGR_{yj}} = NFI_{yj} + ID_{yj} - AR_{yj}$

$NFIAGR_{yj}$ Net Farm Income from AGR-Lite for insurance year y = 1999 to 2010 for

farm j