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Risk Ratings Pocket Calculator Worksheet

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To make production, marketing and financial decisions, producers should develop reasonable expectations of prices and yields. Expected (most likely) yields and prices are not "sufficient" for decision making. Neither prices nor yields can be forecast with sufficient accuracy for decision making at the times critical decisions must be made. To account for forecast error, the odds of higher and lower prices and yields need to be considered.

Effective decisions cannot be made in a risky environment without specific consideration of risks. Using the odds of prices and yields in risk-rated management strategies is an attempt to deal with the realities of the environment in which producers must make decisions.

Agricultural producers face two basic types of risks: business risks and financial risks. Business risks represent the chance of a loss or adverse outcome resulting from unfavorable production and/or unfavorable market prices.

Financial risk may be defined as the chance of loss or adverse outcome attributable to debt financing. Financial risk relates to not being able to meet debt service commitments and the loss in equity if debt commitments are not met. Financial risk affects net revenue commitments or requirements and thus affects net revenue levels considered as critical or adverse. The chance or probability of an adverse outcome is a function of variability of possible net revenues and net revenue levels considered to be adverse or critical. Risk management decisions must consider both business and financial risks.

"Expected," "optimistic," and "pessimistic" are termed "risk ratings" and are used in reference to prices and yields. The resulting per unit net revenue distribution can be again partitioned at points representing "expected," "optimistic," and "pessimistic" net revenue outcomes. Optimistic can be defined as the forecast value that the actual yield, price, and net revenue, when it occurs, will be equal to or exceeded one time out of six. The expected value is the forecast value that the actual or observed yield, price, and net revenue will exceed 50 percent of the time or will be less than 50 percent of the time. The pessimistic value is the estimated value that the actual yield, price, and net revenue will be equal to or less than one time out of six. (For more detail see OSU Fact Sheet # 159)

Why Risk-Rated Decisions?

Using expected prices, yields, costs, and net revenues may not provide sufficient information to make production, marketing, or financial decisions. For example, the expected return from winter stockers could be $15 per head. But, one time out of six, a loss greater than $60 per head could happen. If the stockers are hedged, forward contracted or if production practices are used to minimize death loss and maximize gain, then one time out of six the loss could be reduced to $20 per head. Producers need to know the impact on protential losses and gains from alternative management strategies.

Risks associated with decisions can be estimated by using computer programs available from the Department of Agricultural Economics, Oklahoma State University or by using the following worksheets.

Worksheet

Required information includes optimistic estimates of prices and yields and an estimate of cost per acre. Cost per acre can be obtained from producer records, calculated using current costs, or from OSU Enterprise Budgets. Price information can be obtained from the latest OSU Market Viewpoints, other probabilistic outlook sources, or by calculating the probabilistic outlook by adjusting outlook information. Yield information must be supplied by the producer.

It is important that producers provide the costs, yields, and prices that fit their operation. Oklahoma State University Enterprise Budgets can be used as guides. As an example, 1984 OSU Enterprise Budget number 76700804 for Wheat--Loam Soils--West South Central Oklahoma was used as a guide. Total operating costs were $90 ($89.48). The expected yield was 30 bushels and the expected price was $3.70.

Optimistic and pessimistic yields must be estimated. Estimates can be obtained by using the producer's records or, based on the producer's knowledge, the best estimate. Data shows that wheat yields in West-South-Central Oklahoma will vary about 6 bushels per acre every one year in six. Thus, the optimistic yield could be 36 bushels and the pessimistic yield 24 bushels.

Price outlook is for an expected price of $3.70 per bushel. OSU research indicates that optimistic and pessimistic price values for a nine-month price prediction can be calculated by adjusting the expected price by 16 percent. Thus, the optimistic and pessimistic price expectations could be calculated by adding and subtracting $0.60 (3.70 times 0.16 equals 0.59). The optimistic price would be $4.30 ($3.70 + $.60 = $4.30), and the pessimistic price would be $3.10 ($3.70 - $0.60 = $3.10).

With the yield, costs, and price information, the worksheet can be completed.

Step 1. Enter the optimistic, expected, and pessimistic yield and prices in blanks 1 through 6.

Step 2. Subtract the expected price from the optimistic price, and enter the value in blank (1 - 2).

Step 3. Subtract the pessimistic price from the expected price, and enter the value in blank (2 - 3).

Step 4. Subtract the expected yield from the optimistic yield, and enter the value in blank (4 - 5).

Step 5. Subtract the pessimistic yield from the expected yield, and enter the value in blank (5 - 6).

Step 6. Enter the expected yield from blank (5) in blank (7).

Step 7. Square the expected yield in blank (7) by multiplying the value by itself. Enter the squared expected yield in blank (8).

Step 8. Enter the Optimistic price difference from blank (1 - 2) in blank (9).

Step 9. Square the optimistic price difference in blank (9) by multiplying the difference by itself. Enter the new value in blank (10).

Step 10. Multiply the value in blank (8) by the value in blank (10). Enter the result in blank (11).

Step 11. Enter the expected price from blank (2) in blank (12). Square the expected price in blank (12) by multiplying it by itself. Enter the result in blank (13).

Step 12. Enter the optimistic yield difference from blank (4 - 5) in blank (14). Square the value in (14) by multiplying it by itself. Enter the result in blank (15).

Step 13. Multiply the result in blank (13) by the result in blank (15). Enter the result in blank (16).

Step 14. Add the result in blank (11) to the result in blank (16). Enter the sum in blank (17).

Step 15. Take the square root of the result in blank (17). Enter the value in blanks (18) and (37).

Step 16. Enter the expected yield from blank (5) in blank (19). Square the value in (19), and enter the result in blank (20).

Step 17. Enter the pessimistic price difference from blank (2 - 3) in blank (21). Square the value in (21), and enter the value in blank (22).

Step 18. Multiply the value in blank (22) by the value in blank (20). Enter the product in blank (23).

Step 19. Enter the expected price from blank (2) in blank (24). Square the value in (24), and enter the result in blank (25).

Step 20. Enter the pessimistic yield difference from blank (5 - 6) in blank (26). Square the value in (26), and enter the value in blank (27).

Step 21. Multiply the value in blank (25) by the value in blank (27). Enter the product in blank (28).

Step 22. Add the values in blanks (23) and (28). Enter the sum in blank (29).

Step 23. Take the square root of the sum in blank (29). Enter the result in blanks (30) and (40).

Step 24. Enter the expected price from blank (2) in blank (31).

Step 25. Enter the expected yield from blank (5) in blank (32).

Step 26. Multiply the expected yield in (31) by the expected yield in (32). Enter the product in blank (33).

Step 27. Enter in blank (34) the cost that was calculated before starting the worksheet.

Step 28. Subtract the costs in blank (34) from the expected total return in blank (33). Enter the result in blanks (35), (36), and (39). This is the expected net revenue.

Step 29. Add the value in (37) to the expected net revenue in blank (36). Enter the result in blank (38). This value is the optimistic net revenue.

Step 30. Subtract the value in blank (40) from the expected net revenue in blank (39). Enter the result in blank (41). This is the pessimistic net revenue.

Interpreting Results

The expected net return in blank (35), the optimistic net return in blank (38), and the pessimistic net return in blank (41) are the important results. The single most likely net return is the value in blank (35). There is a 50 percent chance that net return will be higher than $14 per acre. And, there is a 50 percent chance that net return will be less than $14 per acre.

Blank (38) is the optimistic net return. In the example, the optimistic net return is $38 per acre. There is one chance in six that the net return will turn out to be equal to or higher than $38 per acre. Conversely, there are five chances out of six that the net return will turn out to be less than $38 per acre.

Blank (41) shows the pessimistic net return. In the example, the pessimistic net return is a $9 per acre loss. Thus, there is one chance in six that the net return will be a loss of $9 per acre or more.

Using the worksheet and risk ratings, producers can calculate the risk-rated net returns. Risk-rated net returns should indicate the odds of losses and gains for production and marketing decisions. Thus, producers could learn to minimize the chance for large losses and maximize the odds for gains.

RISK RATINGS

POCKET CALCULATOR WORKSHEET

EXAMPLE

RISK-RATED PRICES:

OPTIMISTIC PRICE 4.30 (1)

DIFFERENCE .60 (1-2)

EXPECTED PRICE 3.70 (2)

DIFFERENCE .60 (2-3)

PESSIMISTIC PRICE 3.10 (3)

RISK-RATED YIELDS:

OPTIMISTIC YIELD 36 (4)

DIFFERENCE 6 (4-5)

EXPECTED YIELD 30 (5)

DIFFERENCE 6 (5-6)

PESSIMISTIC YIELD 24 (6)

RISK-RATED NET REVENUES

EXPECTED YIELD 30 (7) SQUARED 900 (8)

OPTIMISTIC PRICE DIFFERENCE .60 (9) SQUARED .36 (10)

MULTIPLIED 324 (11)

EXPECTED PRICE 3.70 (12) SQUARED 13.69 (13)

OPTIMISTIC YIELD DIFFERENCE 6 (14) SQUARED 36 (15)

MULTIPLIED 493 (16)

TOTAL 817 (17)

OPTIMISTIC NET REVENUE DIFFERENCE = SQUARE ROOT = 28.60 (18)

EXPECTED YIELD 30 (19) SQUARED 900 (20)

PESSIMISTIC PRICE DIFFERENCE .60 (21) SQUARED .36 (22)

MULTIPLIED 324 (23)

EXPECTED PRICE 3.70 (24) SQUARED 13.69 (25)

PESSIMISTIC YIELD DIFFERENCE 6 (26) SQUARED 36 (27)

MULTIPLIED 493 (28)

TOTAL 817 (29)

PESSIMISTIC NET REVENUE DIFFERENCE = SQUARE ROOT = 28.60 (30)

EXPECTED NET REVENUE:

EXPECTED PRICE 3.70 (31)

TIMES EXPECTED YIELD 30 (32) = 111 (33)

MINUS COST PER UNIT 90 (34)

EQUALS EXPECTED NET REVENUE 21 (35)

OPTIMISTIC NET REVENUE:

EXPECTED NET REVENUE 21 (36)

PLUS OPTIMISTIC NET REVENUE DIFFERENCE 28.60 (37)

EQUALS OPTIMISTIC NET REVENUE 49.60 (38)

PESSIMISTIC NET REVENUE:

EXPECTED NET REVENUE 21 (39)

MINUS PESSIMISTIC NET REVENUE DIFFERENCE 28.60 (40)

EQUALS PESSIMISTIC NET REVENUE -7.6 (41)

RISK RATINGS

POCKET CALCULATOR WORKSHEET

RISK-RATED PRICES:

OPTIMISTIC PRICE _____ (1)

DIFFERENCE _____ (1-2)

EXPECTED PRICE _____ (2)

DIFFERENCE _____ (2-3)

PESSIMISTIC PRICE _____ (3)

RISK-RATED YIELDS:

OPTIMISTIC YIELD _____ (4)

DIFFERENCE _____ (4-5)

EXPECTED YIELD _____ (5)

DIFFERENCE _____ (5-6)

PESSIMISTIC YIELD _____ (6)

RISK-RATED NET REVENUES

EXPECTED YIELD _____ (7) SQUARED _____ (8)

OPTIMISTIC PRICE DIFFERENCE _____ (9) SQUARED _____ (10)

MULTIPLIED _____ (11)

EXPECTED PRICE _____ (12) SQUARED _____ (13)

OPTIMISTIC YIELD DIFFERENCE _____ (14) SQUARED _____ (15)

MULTIPLIED _____ (16)

TOTAL _____ (17)

OPTIMISTIC NET REVENUE DIFFERENCE = SQUARE ROOT = _____ (18)

EXPECTED YIELD _____ (19) SQUARED _____ (20)

PESSIMISTIC PRICE DIFFERENCE _____ (21) SQUARED _____ (22)

MULTIPLIED _____ (23)

EXPECTED PRICE _____ (24) SQUARED _____ (25)

PESSIMISTIC YIELD DIFFERENCE _____ (26) SQUARED _____ (27)

MULTIPLIED _____ (28)

TOTAL _____ (29)

PESSIMISTIC NET REVENUE DIFFERENCE = SQUARE ROOT = _____ (30)

EXPECTED NET REVENUE:

EXPECTED PRICE _____ (31)

TIMES EXPECTED YIELD _____ (32) = _____ (33)

MINUS COST PER UNIT _____ (34)

EQUALS EXPECTED NET REVENUE _____ (35)

OPTIMISTIC NET REVENUE:

EXPECTED NET REVENUE _____ (36)

PLUS OPTIMISTIC NET REVENUE DIFFERENCE _____ (37)

EQUALS OPTIMISTIC NET REVENUE _____ (38)

PESSIMISTIC NET REVENUE:

EXPECTED NET REVENUE _____ (39)

MINUS PESSIMISTIC NET REVENUE DIFFERENCE _____ (40)

EQUALS PESSIMISTIC NET REVENUE _____ (41)

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