AGRICULTURAL ECONOMICS

September 19, 2018

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Cornhusker Economics

The Corn/Soybean Rotation and Profitability

Market Report	Year Ago	4 Wks Ago	9-14-18
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.	*	*	*
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	177.83	165.24	173.87
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	160.86	161.34	159.04
Choice Boxed Beef, 600-750 lb. Carcass.	191.03	209.70	205.09
Western Corn Belt Base Hog Price Carcass, Negotiated	52.30	40.22	51.69
Pork Carcass Cutout, 185 lb. Carcass 51-52% Lean.	78.52	67.12	71.19
Slaughter Lambs, wooled and shorn, 135-165 lb. National.	168.50	146.39	150.61
National Carcass Lamb Cutout FOB.	403.44	374.00	380.85
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	3.22	5.04	4.45
Corn, No. 2, Yellow **Columbus**, bu.	3.09	3.45	3.09
Soybeans, No. 1, Yellow **Columbus,** bu.	8.847	7.88	7.04
Grain Sorghum, No.2, Yellow Dorchester, cwt.	5.21	5.39	4.96
Oats, No. 2, Heavy Minneapolis, Mn, bu.	2.83	2.94	2.82
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	*	*	*
Alfalfa, Large Rounds, Good Platte Valley, ton.	87.50	102.50	102.50
Grass Hay, Large Rounds, Good Nebraska, ton.	87.50	100.00	102.50
Dried Distillers Grains, 10% Moisture Nebraska Average.	115.00	121.50	133.50
Wet Distillers Grains, 65-70% Moisture Nebraska Average.	40.00	42.24	44.50

*** No Market**

One of the most basic questions farmers must answer on an annual basis is what to plant. In some cases this is simply a choice among cultivars in others it is a choice among different crop types. In Nebraska the choice may vary considerably since many different crop types are grown. This discussion focuses on the factors that affect profitability, which are created by both biology and economics, and how that might be used to make the best crop rotation selection between corn and soybean cropping systems.

The profit equation in its simplest form can be defined as total revenue (TR) minus total costs (TC) equals profit. This profit equation captures the physical realities of production by using both revenue and cost measures. This fact makes this equation a powerful tool for making many business and production choices. This equation makes relationship between costs and revenue simple to apply.

In the instance of the varying corn and soybean rotations, several biological factors have been generally realized and accepted. First, corn following soybean production can generally be expected to exceed continuous corn production yields. Irrigated fields are noted to have less of an increase in yields compared to those of dryland production. Secondly, soybean productivity is increased following one year of corn culture but even more so following two consecutive years of corn production. Thirdly, soybean production fixes nitrogen that may be available for the fol-

lowing season's crop. This usually amounts to about 40 to 60 lbs. of N per acre depending on the conditions and productivity of the soybeans.

Obviously the TR generated from the production of any crop or crop rotation must exceed the TC of producing that crop for profit to be realized. TR for this discussion is defined as the price/value of the product being produced multiplied by the quantity produced. The production of 100 bushels/acre of corn sold at a $4.00 market price provides a total revenue per acre of $400.00. The same calculation for soybeans could be made depending on its yield and value at the time it is sold. TC is more complex and can be further divided into two main components. These components are total fixed costs (TFC) and total variable costs (TVC). The TFC is a cost that is realized regardless of productivity and is fixed for the relevant time period. In a single season a fixed cost could be a set price for renting land ($300/ac). TVC are those things that vary and are related to productivity, a common example would be nitrogen fertilizer.

Using the fact that corn is more productive following soybeans verses following itself and that some residual nitrogen is available, a higher TR would be expected and a lower TVC would show that corn grown following soybeans is more profitable than corn grown following corn. The problem with this simple analysis is that it doesn't account for the fact that growing soybeans the previous year may have been more or less profitable than growing corn. Therefore, a good decision requires considering the value of the rotation over its duration, in this case a minimum of two years. The same result could be said of soybeans following corn or soybeans following two years of corn, which has a three-year rotation period. The appropriate answer to the question requires an analysis over the full cycle of the rotation. This fact adds complexity and requires careful consideration for the most relevant driving factors, which are corn and soybean prices and differences in production costs and yields.

Interestingly the profitability of growing, continuous corn, versus alternating with soybean in some combination is specific to individual producers. Looking at past information from Iowa, given historical average yields, costs and prices, it can be seen that in some years soybean production was more profitable/less costly than corn production and vice versa. Therefore, market values and production costs vary enough among years so that neither crop dominates as always being most profitable. These facts point to the importance of individual farmers knowing the potential productivity of both crops on their respective farms, understanding trends in their local corn and soybean market and having a handle on the varying differences in costs. It is beneficial to balance these primary effects in making a cropping systems selection. Producer's crop selection decision becomes more profit centered as they are able to accurately quantify the three primary effects listed above. While not mentioned earlier, there may be other effects of different rotations. For instance, capital investment costs may be lowered by adding an additional crop. In the case of corn and soybeans which are harvested and planted at different times, it is theoretically possible to use equipment, labor and time more efficiently thus lowering costs

As mentioned above, crop rotations have many biological and economic implications. When the profit equation is applied, decision makers can make profit-centered choices for their farm. Crop rotations are best analyzed as multi-year rotation plans. The three primary drivers to consider in the corn/soybean rotation are corn and soybean prices, expected fertilizer costs and expected yields. Each of these three factors potentially affect rotation choice and therefore become an individual farm decision. Obviously one cannot predict the future but it is smart to consider forecasted prices for markets and production costs. For this reason, it is vital to do the math to clearly see the outcome and make a fair comparison among cropping alternatives.

Matt Stockton
Department of Agricultural Economics
University of Nebraska-Lincoln
West Central Research and Extension Center
North Platte, NE 69101
mstockton2@unl.edu

Devin Broadhead
Research Analyst
University of Nebraska-Lincoln
West Central Research and Extension Center
North Platte, NE 69101
Devin.broadhead@unl.edu