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STRIPPER HEADER AND DIRECT SEEDING: RON AND ANDY JURIS

Farmer-to-Farmer Case Study Series: Increasing Resilience among Cereal-Based Farmers in the Inland Pacific Northwest

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STRIPPER HEADER AND DIRECT SEEDING: RON AND ANDY JURIS

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Abstract

Ron and Andy Juris farm in Bickleton, Washington, in an area receiving about 8–12 inches of annual precipitation. In this publication, the Jurises discuss their use of a stripper header for conserving standing residue, as well as their use of direct seeding.

This case study is part of the Farmer-to-Farmer Case Study project, which explores innovative approaches regional farmers are using that may increase their resilience in the face of a changing climate.

Information presented is based on growers' experiences and expertise and should not be considered as university recommendations. Mention of trade names or commercial products is solely for the purpose of providing specific information and does not imply recommendation or endorsement. Grower quotes have been edited slightly for clarity, without changing the meaning.

Readers interested in other case studies in this series can access them at on the REACCH website, as well as in the WSU Extension Learning Library.

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Stripper Header and Direct Seeding: Ron and Andy Juris

Photo: Matt Ziegler

Location: Bickleton, WA

Average Annual Precipitation: 8–12 inches

Cropping System: Primarily soft white and hard red spring wheat, with occasional winter wheat when conditions allow. Small amounts of dryland alfalfa (500 acres) and forage grains (124-250 acres).

Watch the companion video, The Stripper Header: Ron and Andy Juris, introducing Ron and Andy Juris and describing the major benefits and challenges they have experienced using a stripper header.

Map: Kaelin Hamel-Rieken, Washington State University

Introduction

Ron and Andy Juris are third and fourth generation farmers in an operation that began in 1930. Together, this father and son team farm about 4,800 acres on the western fringe of the Horse Heaven Hills in Bickleton, WA. The farm has a short growing season due to its location on a high plateau (3,000 feet), and is in one of the driest wheat-producing regions in the world (Schillinger and Young 2014). Shallow silt loam soils (30 to 36 inches) further limit available soil moisture and present a high risk of erosion (Figure 1). Average annual precipitation is quite variable across their farm, ranging from 12 inches near the town of Bickleton down to 8 inches or less in fields that are further to the east.

Figure 1. The land that Ron and Andy Juris farm is defined by low rainfall and shallow soils, as well as oddly shaped fields (note the un-farmed areas in the background). Photo: Matt Ziegler.

To cope with these challenges, the Jurises have adopted a range of creative strategies and a unique farming perspective. Among recent changes, they have purchased a lower disturbance drill that can penetrate high residue levels, and a stripper header for their combine. The stripper header utilizes stainless steel “fingers” that rotate in a backwards direction in front of an auger, while the combine moves forward. Instead of cutting the wheat plant, the stripper header catches the heads of wheat and strips the kernels off, throwing them into the auger. This harvest method leaves almost all crop residues standing in the field (Figure 2). In contrast, a traditional header cuts the wheat, threshes the grain, and leaves the cut straw on the ground.

Figure 2. Close-up showing a barley plant after harvest with a stripper header. Photo: Lauren Port.

A Heritage of Innovation

Ron and Andy were born into a family of innovators. Ron says, "We have a picture of my grandfather and his two sons—my dad being one of them—out in the middle of a summer fallow field with a big handful of straw (Figure 3). He was one of the first to replace a bottom plow with less severe tillage. That's been my heritage, and I had the opportunity to pass it on to Andy."

Ron's own experimentation began when he purchased a Concord no-till drill in 1996. By the end of the 1990s, he had shifted the whole farm to direct seeding. During those years, he also switched from a winter wheat-fallow rotation to an annual spring wheat rotation without fallow (Figure 4). (Some winter wheat is also planted following spring wheat in years when fall moisture and other conditions are optimal.) The goal of these changes was to reduce erosion and improve overall yields. "We're getting more out of annual cropping than we were getting out of wheat-fallow. We're using almost all the water that we get, whereas before a lot of it was running off, and we had a terrible sheet and rill erosion problem. In an average year, we just could not hold that second-year rainfall."

Figure 3. A family picture showing Ron's grandfather (right), father (center), and uncle (left) as they shifted away from moldboard plowing to less intensive tillage to preserve residue. Photo: Juris Family.

Figure 4. The Jurises grow predominantly spring wheat, including the club wheat shown here. Photo: Matt Ziegler.

In 2008, after ten years in the aviation industry, Andy returned to full-time farming with his dad. Continuing to build on their direct seed foundation, the Jurises have adopted a range of new equipment, technologies, and cropping strategies over the last few years. This includes improving their residue and soil moisture management through investment in a lower disturbance drill and a stripper header for harvest. It also includes adopting several precision agriculture technologies and experimenting with non-cereal crops. (See the Jurises' Use of Precision Agriculture sidebar for more information.)

The Jurises hope that these strategies will help them cut costs, conserve soil moisture, improve crop yields, and enhance their flexibility in an ever-changing market. Knowing that wheat prices tend to be cyclical, they considered the time when prices were high as a good time to invest. Ron explains, "We have the financial ability from the good prices we've had, and

The Jurises' Use of Precision Agriculture

Along with other innovations, the Jurises invested in precision agriculture beginning in about 2009. During planting, Raven auto-section control on the drill, and integrated auto-steer on the tractor allows them to vary fertilizer application rate and seeding rate.

To develop their prescription maps for nitrogen application, they used a Veris electrical conductivity (EC) sensor to map their ground. That same year, they also put a yield monitor on the combine. Though they have found the two data sets generally agree, they have used yield data over time to refine the prescription maps developed from EC data. With experience, they have moved to using fewer fertilizer management zones. Andy explains, "In some fields I've had eight zones; now, I have three. In this dry country where we don't know what we're going to get for water, it seems like just having a low, mid, and high rate works pretty well."

In describing outcomes, Andy comments, "The auto-section is where the savings are for us. Some of our most difficult-to-farm fields were in that 25 percent overlap range. When you take it down to five or six or even eight percent, there are some significant savings." In comparison, "the variable rate side of it is a lot harder to quantify. It is nice when we go through our low spots and they're not burnt to a crisp anymore. Maybe we still don't have much wheat, but what is there is better quality."

To date, they have not used variable rate seeding. However, Andy has been thinking about developing some simple maps that would allow him to increase seeding rates in areas of the field that tend to have wireworms.

understanding bankers who appreciate our long-range plans. We're trying to learn the lessons now when we can better afford them so that hopefully later we don't make the mistakes when we can't afford them."

Ron's wealth of experience, in combination with Andy's recent training and focus on technology and the future, make this a complementary team. As Andy says "I have a long-term outlook because I need to make sure the operation stays profitable over the next 30 to 40 years."

Current Residue and Soil Moisture Management System

Two key pieces of equipment define their system for managing residue and soil moisture: a cross slot drill, purchased in 2011, and a stripper header, purchased in 2013. These two pieces work together to conserve residues and moisture (Figure 5).

Figure 5. Residue left in a standing spring wheat crop in July 2014. Photo: Hilary Davis.

Cross Slot Drill

Their previous Concord no-till drill, a common choice for their area, had a shovel-type opener that moved a fair amount of soil. The cross slot drill was purchased in an effort to reduce this disturbance and retain more soil moisture. It is also able to penetrate higher amounts of residue than their previous hoe-type drill, supporting investment in the stripper header. The cross slot has a hybrid opener system, with a narrow hoe opener and a disc blade in the middle (Figure 6).

Their cross slot drill has very precise seed placement, a feature that the Jurises find helpful when soil moisture conditions are less than ideal. Modifying the drill with a reduction system has allowed it to perform quite well when planting smaller-seeded crops such as alfalfa, canola, and flax, crops that the Jurises have been experimenting with over the last several years.

Although it has been a great tool for them, Ron comments that the cross slot drill is more expensive than a hoe-type drill and that higher maintenance requirements means it may not be the right piece of equipment for everyone. "If you don't like to do maintenance and you don't like to pay attention to wheel bearings—if you just like to hook on your drill, tear out in the field, and plant your crop, you better go with a hoe opener."

Figure 6. Rendering of a cross slot drill, showing the narrow hoe opener and disc blade (L). The seed and fertilizer are placed in the horizontal slot (R). Graphics: Baker No-Tillage Limited.

Stripper Header

The stripper header, which replaces a traditional Draper header, is the other key piece of equipment in the Jurises' residue and soil moisture management strategy (Figure 7). The stripper header is a Shelbourne Reynolds CVS 32-foot model. Ideally the Jurises would prefer to run a 36-foot header, but this wasn't an option until 2014. As of 2014, Shelbourne Reynolds was the only company that distributed stripper headers worldwide.

Figure 7. The Jurises' stripper header, mounted on their combine. Photo: Hilary Davis.

The Jurises have found that their stripper header works quite well with few modifications. As Andy says, "We put some really heavy-duty skid plates on it because we have real rocks here (Figure 8). Aside from that, out of the box it worked pretty well. I was really impressed with how smoothly it runs."

Initial cost and maintenance expenses are similar for the stripper and Draper header. However, the timing of maintenance costs varies. With a traditional header, cutter sections and other parts are replaced on a regular basis, so there are frequent, relatively small maintenance costs.

Figure 8. Skid plates on the bottom of the stripper header help protect it from damage from rocks. Photo: Matt Ziegler.

Figure 9. Fingers in the header, which strips the wheat head from the stalk, need to be replaced periodically. The Jurises have found overall maintenance costs to be similar for a traditional header and a stripper header. Photo: Matt Ziegler.

However, when the rotor is worn out on a stripper header, the whole set of "fingers" will need to be replaced at once, about a $5,000 expense (Figure 9).

Weed Management

The Jurises have had to adapt their weed management system to accommodate the stripper header. Ron notes, “We were already waiting until all the weeds were above any residue so that we could get a burn-down. We only get one shot to get our green bridge nailed down and have our planting done because we have such a narrow window. The tall stubble complicates that, because it’s harder to make sure that the herbicide gets into the stubble to make contact with the weeds.”

The Jurises, who have a John Deere 4830 sprayer, feel that the key to penetrating the stubble canopy is adequate coverage. They use a minimum of 10 gallons of spray mix per acre and often use 15–20 gallons if the situation warrants. (This is the same coverage they use in short stubble, but they see some farmers around them reducing coverage in an attempt to cut costs.) When they spray, they use a boom height 24–28 inches above the ground, as straw is seldom higher than this in their area. They have also built and added spray nozzles in front of the tires on their sprayer, so that wheel tracks receive two applications of herbicide. Finally, they have switched to a double fan nozzle on their herbicide applicator, which swirls the spray into the tall stubble from several different angles to improve coverage (Figure 10).

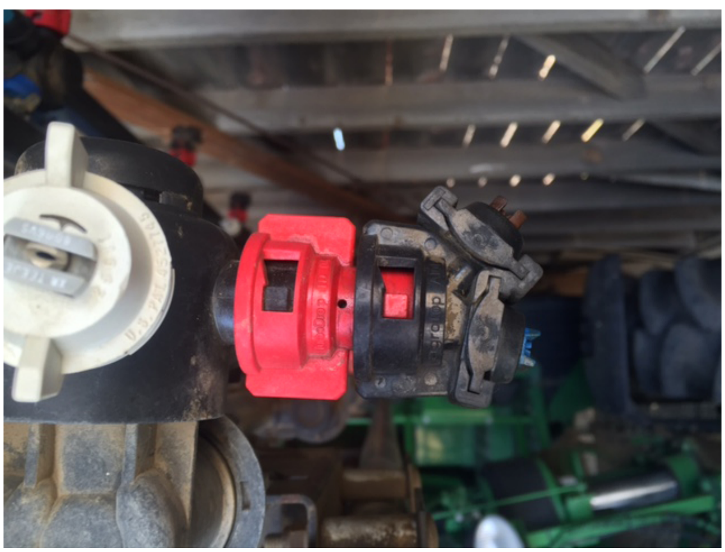

Figure 10. The Jurises have switched to using an herbicide application nozzle that has a double fan. The pictured dual fan nozzle is from Greenleaf Technologies, and the Jurises have also used TeeJet Turbo TwinJet nozzles. Photo: Andy Juris.

Benefits

The Jurises have found that the cross slot drill and the stripper header conserve moisture well, especially in drier years. The taller residue from the stripper header increases moisture capture, while both the stripper header and the cross slot reduce moisture losses. Ron comments, “This last year [in 2014], we had one of our fog years up here. What we saw was

Figure 11. Wheat residue after stripper header harvest, covered with frost during January of 2014. Photo: Andy Juris.

that all of the tall stubble scraped the frost out of the fog as it went by. It just built up. It’s not a huge amount of moisture, but in a year like this we probably gained another tenth or two of moisture that the short stubble didn’t get (Figure 11).”

He also feels that the taller stubble helps trap blowing snow. In late 2013, after a half inch of snow, this was particularly evident on two adjacent fields. On one field, the wheat had been harvested with a stripper header while on the other, forage triticale had been mowed off at furrow height (Figure 12). In the ditch that ran along the side of both fields, there was no snow next to the wheat field, as it had been trapped in the field by the standing stubble. In contrast, next to the field of forage triticale, the ditch was full of snow that had blown off the field.

The Jurises also feel that the standing residue improves conditions for small plants by shading the soil and reducing wind speeds at ground level (Figure 13). This was particularly apparent on a windy spring day in 2014. “We went out with a wind meter and checked wheat growing up in tall stubble and saw that we had about a six miles-per-hour wind where the 2-leaf wheat was. And up above, the wind was 14 and 15 miles per hour, gusting to 24 or 25.” Research in the Pacific Northwest and elsewhere has indicated that shading and reduced wind can benefit moisture retention. (See the two sidebars, Stripper Header Maximizes Residues in Combination with Rotation and Crop Variety Choices, and Soil Moisture Uniformity Improves Winter Canola Establishment in Stripper Header Stubble in 2013)

While they have heard some concerns from other farmers that use of a stripper header might delay warming of the soil in springtime, they have not so far experienced any issues with this.

Figure 12. The ditch next to two adjacent fields on the Juris farm following approximately 1/2 inch of snowfall in late 2013. Notice that there is no snow in the ditch next to the field of wheat that had been harvested by the stripper header as it had been trapped in the field by the standing stubble (left). Meanwhile the ditch next to the field of forage triticale that had been mowed at furrow height is full of snow that blew off the field (right). Photos: Ron Juris.

Figure 13. Winter wheat coming up in the tall stripper header stubble, February 2015. Photos: Andy Juris.

Both the cross slot drill and the stripper header have had unintended benefits for their operation. The cross slot drill has made them more keenly aware of compaction issues. Andy says, “When you operate a cross slot you are monitoring how much pressure is required to push the openers into the ground. When we cross an area where trucks parked or we turned equipment around I can easily tell the compaction by the spike in hydraulic pressure. I was also amazed at how much our combine can compact the soil even though it is dry during harvest.” After seeing this, the Jurises instituted a plan to have grain cart drivers consistently use the same path in and out of the field, and to have support equipment stay in one place rather than driving across the field.

Meanwhile, the Jurises have found that the stripper header reduces wear on their combine, because minimal straw enters the combine. This also increases the speed of harvesting. Andy

Stripper Header Maximizes Residues in Combination with Rotation and Crop Variety Choices

Lauren Port, Department of Crop and Soil Sciences, Washington State University; and Frank Young, US Department of Agriculture, Agricultural Research Service

Previous research in Pendleton and Moro, OR, and Sidney, MT, has indicated that a stripper header can be effectively used to harvest wheat, and that a stripper header combine travelling over 4.3 miles per hour has comparable losses to a cutter bar header combine travelling at 0.8 to 2.7 miles per hour (Wilkins et al. 1996). Research also suggests that tall standing stubble, such as that produced by a stripper header, can improve soil water retention by capturing more snow, reducing soil-water evaporation, and reducing wind speeds at the soil surface (Black and Siddoway 1977; Nielsen 1995; McMaster et al. 2000; Nielsen et al. 2005).

Since 2011, researchers at the Ralston Project in Ralston, WA, have been exploring the use of a stripper header and crop rotation to maximize residue production and conservation. They have been growing tall winter wheat and winter triticale, which produce up to 80% more straw than has been produced by semi-dwarf winter wheat at this site. Following harvest with a stripper header, the standing stubble has been up to 36 inches tall (Figure 14).

In addition to evaluating differences in carbon storage in a high-residue cropping system, the team has been investigating whether water storage and retention are influenced by stripper header stubble. Research has

Figure 14. Residue harvested with the stripper header (top) has been up to 36 inches tall, compared to 19 inches for residue harvested with a traditional header (bottom). Photos: Frank Young.

shown that the tall stripper header residue shades the soil and reduces wind speeds. Soil temperatures measured at seeding depth in bare soil shaded by stripper header residue have been 10 or more degrees (F) lower than their counterparts in soil that is shaded by residues harvested conventionally. These lower soil temperatures can reduce evaporation of soil moisture, leading to better water retention. They can also reduce the heat that germinating seeds and emerging seedlings are subjected to after planting, benefitting crop establishment. Wind speeds 6 inches above the soil surface in standing stripper header stubble have been recorded at just 1/4 of velocity of the wind speed in reduced tillage fallow (no upright residue) (Figure 15). Reduced wind speeds can decrease evaporation of soil moisture, and greatly reduce wind erosion of soil particles.

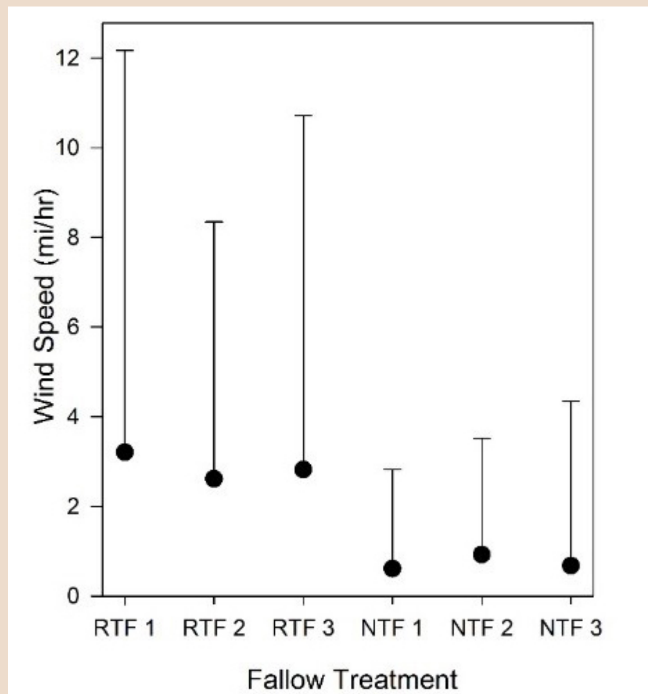

Figure 15. Average and maximum wind speeds recorded in three replicates of reduced tillage fallow (RTF1-3), and no-till stubble (NTF 1-3). Filled circle is the average value, and bar represents the maximum recorded wind speed.

Soil Moisture Uniformity Improves Winter Canola Establishment in Stripper Header Stubble in 2013

Lauren Port, Department of Crop and Soil Sciences, Washington State University; and Frank Young, US Department of Agriculture, Agricultural Research Service

A stripper header has been used for harvest at the Ralston Project since 2011. (See the Stripper Header Maximizes Residues in Combination with Rotation and Crop Variety Choices sidebar for additional description of the experiments and crop rotations.) Across the rotation, the research team has been investigating whether water storage and retention are influenced by stripper header stubble.

Soil sampling in 2013 and 2014 indicated that seed zone soil moisture (0–3’’ depth) at the time of winter canola seeding was higher in no-till stripper header winter triticale residue than in reduced tillage winter wheat residue. The greater availability and uniformity of seed zone soil moisture led to better establishment of winter canola in stripper header no-till fallow when compared to reduced tillage fallow (Figure 16).

Adoption of winter canola in the low-rainfall zone has been slow because of problems establishing the crop. Managing seed zone moisture through production of high-biomass cereal crops followed by stripper header harvest and no-till fallow provides one possible solution.

Figure 16. Picture taken in mid-September 2013, showing establishment of winter canola following tilled winter wheat fallow (left) and winter wheat harvested with a stripper header and then managed with chemical fallow (right). Photos: Lauren Port.

estimates that he can harvest about 1.5 to 1.8 times as fast using a stripper header as he could with a draper header. “Last year, in some of our custom harvesting, we were harvesting a 90-bushel-per-acre wheat field with a class seven combine going anywhere from five to seven miles per hour depending on the conditions and getting full every fifteen minutes or so.”

Challenges

Of all the challenges the Jurises face, Ron thinks that the biggest is the higher level of management required by their current system. “With summer fallow tillage, if we did a halfway decent job of keeping the weeds down, we stood a reasonable chance of having a fair crop every year, though it came with the increasing cost of fuel, labor, and the environmental cost of erosion. The system we have now is capable of doing more with less, but the level of management needed to make it work is much higher and that’s really a challenge that we have to be willing to accept. For example, the machinery has a lot more complicated moving parts, and so it requires more maintenance. We have to be on top of it and be willing to do that.”

The Jurises are also very concerned about their dependence on glyphosate to successfully carry out their direct seeding system. “We’ve been trying to figure out what we can do to try to mix that up. We have tried other chemicals. Nothing works as effectively on everything as Roundup. But we’ve got to be paying attention to that.” (See the Herbicide Resistance in the

Inland Pacific Northwest sidebar.) For control of Russian thistle in the summer, they use paraquat, despite its higher expense and more delicate handling. It is their feeling that paraquat works better in the warm summer, and also helps them diversify their herbicide regime.

Herbicide Resistance in the Inland Pacific Northwest

Kristy Borrelli, Pennsylvania State University Extension; and Ian Burke, Department of Crop and Soil Sciences, Washington State University

Herbicide-resistant weed populations result from repeated application of the same herbicide or group of herbicides with the same mode of action. Selection can occur in just a few years or take much longer. Weeds resistant to herbicides occur naturally, and are present in very small numbers. Herbicide usage allows resistant weeds to survive, and then reproduce and increase in numbers. Ultimately, more and more resistant weeds are present, and the herbicide is no longer effective. As of 2014, 220 weed species had evolved resistance to one or more herbicides globally (Heap 2015). The main reason that herbicide resistance is increasing is that limited discovery of new herbicide modes of action for the last 30 years has made farmers reliant on an existing few.

Weed resistance to Group A/1 (ACCase inhibitors), Group B/2 (ALS/AHAS inhibitors) and Group O/4 (synthetic auxins) herbicides currently pose the greatest challenges to Pacific Northwest farmers. (Detailed information about herbicide groups and modes of actions can be found on the International Survey of Herbicide Resistant Weeds website.) These groups of herbicides are commonly used for controlling weed species such as Downy brome, Italian ryegrass, Kochia, mayweed chamomile, prickly lettuce, Russian thistle, and wild oat in wheat-based cropping systems. Biotypes of each of these weed species have been found to have resistance to one or more Group A/1, B/2, or O/4 herbicides in WA, OR, or ID (Campbell et al., 2011).

Although glyphosate resistance is a growing concern in the US, very few cases of glyphosate-resistant weeds have been found in the Pacific Northwest to date (Campbell et al. 2011). Glyphosate resistance is more common in cropping systems that feature Roundup Ready crops like corn, soybean, or cotton and rely on repeated glyphosate (Group G/9; EPSPS inhibitors) applications for weed control (Boerboom and Owen, nd.). Currently, Roundup Ready wheat is not available, but glyphosate is used extensively in wheat-fallow rotations, as a pre-plant treatment, and as an aid to harvest. Glyphosate is an essential tool for controlling weeds in direct-seed and reduced tillage cropping systems.

The risks of developing herbicide-resistant weeds can be reduced by practices such as crop rotation and diversifying herbicide modes of action. It is recommended to not use herbicides with the same mode of action more than once within three years (Campbell et al. 2011). Herbicides should always be applied at labelled rates and at the correct stage of weed and crop growth to increase effective control. Features such as life cycle, growth habit, and maturity length can also help improve a crop's competitiveness with weeds. Crop rotation often reduces weed pressure and facilitates herbicide rotation as well. Cultivation can also help eliminate weed escapes and resistant species of weeds, but can be challenging in direct-seed or reduced tillage cropping systems. Adopting multiple strategies for weed control, rather than relying on a single herbicide strategy, minimizes the risk of herbicide resistance.

The taller standing stubble that results from the stripper header can complicate weed control efforts overall, especially for grassy weeds like cheat grass (downy brome) and rattail fescue that are a challenge even in traditionally harvested acreage. So far, they have felt that their strategies for ensuring good herbicide coverage (discussed above) are meeting this challenge.

Other challenges so far have been minimal. The Jurises have had to get used to the new "look" of all the tall stripper header stubble. They have had to consider a slightly increased fire hazard for vehicles, and as Andy says, "You polish the underside of your equipment pretty well with all of that tall stubble." In addition, because there are currently not many stripper headers in the Pacific Northwest, the Jurises carry a bit of inventory for spare parts to make unexpected repairs in a timely way. Lastly, because the stripper header is not adapted for a shatter-prone crop like canola, they still use their traditional header when harvesting that crop.

Managing Risk

To minimize risk, the Jurises are trying to develop as flexible an operation as they can—from the crops they grow, to the equipment they use, to their mindset. As Andy says, "When you have equipment that can seed a variety of crops, and do it quickly if you need to—or a sprayer that can cover ground quickly…this type of equipment gives you the flexibility to hopefully meet a challenge."

The Jurises are also uniquely conscious of the risk from failing to innovate (Figure 17). As Andy says, "It's easy to see dollars going out of your operation, whether to buy new equipment or fancy fertilizer or whatever. You look at those dollars leaving and you say, 'We can't do this.' I think most farmers are very conservative fiscally. It's harder to see the dollars that you never got, either by choice of equipment or farming practices or whatever. We're trying to really think: what are the missed opportunities or what is the cost of a missed opportunity, and how can we mitigate that risk? Because you're always at 100% risk no matter what you do."

One of the things that the Jurises have done to try to think about the risks from their current practices is to do a "SWOT" analysis, thinking systematically about their strengths, weaknesses, opportunities, and threats. (See the Building on Strengths to Create Opportunities sidebar.)

One last strategy that the Jurises are using to reduce their long-term risk is to renew their experimentation with non-wheat crops. In the last few years, the Jurises have been experimenting with dryland alfalfa (Figure 18), forage grains, winter and spring canola, and flax. Although they have met some successes with each crop, they have also encountered setbacks, so they continue to seek better management strategies and evaluate whether each of these crops can be profitably incorporated in their area. (See the Managing for Profit Maximization sidebar.) Although it has not been easy, Ron and Andy see two major reasons to continue. First, they are hopeful that adding crop diversity will reduce agronomic risk by breaking up weed and disease (e.g., Rhizoctonia root rot) cycles in their wheat, and that canola might break up their hardpan with its taproot. Second, they know that wheat prices fluctuate, and having more crop choices will reduce economic risk, increasing their resilience.

Figure 17. Ron and Andy regularly discuss innovations for the future to reduce risk and help their operation remain viable. Photo: Matt Ziegler

Building on Strengths to Create Opportunities

Because of the marginal rainfall that the Juris farm receives, the Jurises are used to living with risk. As Ron says, "If we get caught with high costs, low prices, and low rainfall, it could spell the end for the operation." To help map a successful path forward, the Jurises have used a "SWOT" analysis to systematically identify their strengths, weaknesses, opportunities, and threats. Within this type of analysis, strengths and weaknesses focus on internal factors such as the family, employees, and management team. Opportunities and threats, on the other hand, focus on external factors, normally things over which the individual business owner has little control (USDA RMA 2008). These factors can include elements such as commodity prices, regulation, competition, interest rates, and weather.

Given their low rainfall, challenging soils, and threats from cyclical changes in wheat markets, the Jurises have focused on building on their strengths. This includes the fact that both Ron and Andy enjoy working on equipment and trying new things. As Ron says, "One of the ways we've kept our operation alive is by offering custom services to others. We do some custom haying for some neighbors who want to do it but can't afford the equipment. And we also do custom harvest for another operation that can't justify a great big machine. That allows us to have up-to-date technology."

They have also invested in their human capital. Recently, this has included sending Andy to attend The Executive Program for Agricultural Producers (TEPAP) program at Texas A&M. As Ron says, "It was not inexpensive, but it's paid big dividends to the operation by having that kind of skill and training."

Figure 18. Alfalfa ground in July 2014 after mowing and baling. The Jurises generally get one cutting of hay, though they sometimes get a second, or a partial second, if conditions are wetter than usual. Photo: Hilary Davis.

Managing for Profit Maximization

The Jurises' current cropping system has spring and winter wheat, alfalfa hay, forage grains, small amounts of some alternative crops, and small plot trials. All of this requires a great deal more management than their old winter wheat-summer fallow system. However, they hope that this strategy pays off by increasing diversity and enhancing their economic sustainability.

Growing dryland alfalfa and forage grain crops is a great example of "thinking outside the box." While the Jurises cannot compete with irrigated alfalfa producers, prices for forage and hay were high enough in the early 2010s that, even in their limited rainfall area, dryland alfalfa was profitable. In 2015, grain prices were low but forage prices remained high, and they could benefit from this in an area where typically no one produces forage on a commercial scale.

Determining which crops are most profitable requires careful allocation of costs and returns to each individual crop. To help support this, the Juris farm has been moving to an accrual-based accounting system. As Ron describes it, "We're learning to look at all of the inputs that go into the 'widgets' (wheat or other products) that we make. We want to get to the point where we know in a particular field what went into it and what came off of it." Accrual-based accounting carefully attributes revenue and expenses to the enterprise that generated them. Thus, it can support sound management decisions by providing information about costs and returns by crop. This is an improvement over cash-based accounting, which gathers revenues and expenses by year. Under cash-based accounting, a given year includes some expenses for a crop that will not be harvested until the following year and revenue for crops produced in prior years.

Though there are several ways to do accrual-based accounting, the TEPAP program that Andy attended emphasizes activity-based costing, which allocates the costs of each cropping activity to each crop. For example, by calculating variable and fixed costs for combine operation per hour or per acre, combine costs can be included in costs for producing wheat. Costs are determined similarly for each machinery operation, and then other expenses such as labor, seed, spray, and fertilizer are added. The University of Idaho has developed a free machinery cost program that will calculate variable and fixed machinery costs, including labor (see Resources).

Knowing costs and returns by crop can provide information about whether a small-scale experiment is worth expanding. The Jurises limit their risks when trying new crops by first planting just a few acres. While this might be difficult when a crop appears to be especially profitable, it is this careful approach to experimentation that allows their operation to remain economically sustainable.

Resources:

The University of Idaho Crop Machinery Cost Calculator is available for free on the IdahoAgBiz website. Other machinery cost resources are listed there as well.

Learning Process

Reflecting on the process of learning about new practices, Andy says, "An equipment salesman or the results from a research experiment are always really nice. But when you hear a farmer say, 'This is what we saw when we tried it,' or see the results or have a guy send you pictures and say, 'Here's what it looks like,' – it is really worth a lot." Given this, the Jurises have found the internet to be a powerful resource for connecting with the farming community in other parts of the country and world.

For example, after the Jurises saw a neighbor successfully using a stripper header, Andy heard that farmers in Texas, Oklahoma, and Kansas were using them extensively to help cope with drought. As Andy talked with some of these farmers online, he realized that “in some areas, the drought-level precipitation was about the rainfall that we get on an average year. They’re used to 22 inches, and now they’re getting 10. So I thought, ‘Well, if this is working for them and the rainfall they’re seeing is similar to what we get in an average year, it’s got to help.’ And they have some pretty compelling research that the universities have done down there, that shows the moisture retention and all of that.”

Looking Forward

Looking forward, the Jurises see ongoing challenges to improve efficiency and stay competitive in a world market. Andy thinks that this challenge may even increase. “With a lot of the technology—auto-section and other precision tools—we’ve picked the low-hanging fruit in terms of our efficiency. What’s next? Now, instead of saving 10%, we are looking at saving 3%.”

Though the Jurises feel that the weather has changed significantly over their lifetime, they give more weight to natural cyclical climate changes such as El Niño Southern Oscillation (ENSO) and Pacific Decadal Oscillation (PDO) than to anthropogenic climate change. In terms of specific changes, Andy says, “When I was a kid, it was pretty common to get snowed in and have ditches plowed as high as the pickup and all of that. Now, other than the winter of 2008—which is considered abnormal now—we’ve had more winters where we never had snow.” Overall, they feel that changes in the weather are unlikely to present a risk more significant than the weather variability already presents in their dry area.

Advice for Others

The Jurises were asked what advice they would give to other growers who are interested in trying a stripper header, direct seeding, or new crops.

Revisit practices that were previously unsuccessful if technologies, markets, or other conditions change. Ron says, “We tried canola back in the 1990s. Financially, it was a disaster. Culturally, we had some problems with it. We abandoned it. We’ve come back and tried it again because the world has changed. There’s now a crusher in Warden. It’s no longer being shipped to Lethbridge, Alberta. We’ve got new varieties and new equipment. So now we’ll go back and take another look at it and try it again.”

Avoid the temptation to judge success or failure too quickly when trying new practices. Andy says, “For me, the biggest challenge in doing new stuff is that I’m either really exuberant or really discouraged.” When he first starts, he may jump in with both feet, but early bumps tend to make him question his entire strategy. When things do not go as he planned, he tries to counter this tendency by telling himself to “calm down, take a step back, take a look at what I think happened, and come back at it another way.”

Do your best to try to imagine what risks you might not be aware of. As Ron says, “You manage the risks you know about, and you do your best. But the one that you don’t know about or understand is just totally killing you, and you don’t know it. That’s something that we’re always working on. That’s why we try to stay tuned to the research at the universities, what they’re doing, what they’re looking at, and what they’re seeing. And that’s why Andy is involved with the various chat groups.”

Being successful takes a mixture of skill and luck. Ron points out that while they have done their best to position the farm to thrive, there’s a lot of old-fashioned “dumb luck” in their operation as well.

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