

## ECONOMIC EFFICIENCY OF VARIETY SELECTION'

Stephen L. Love

The purpose of this presentation is two-fold: 1) to provide information about potato varieties and markets that can serve as alternatives to the traditional Russet Burbank market, and 2) give information on the economics of growing alternate varieties.

Idaho potato growers have historically grown Russet Burbank potatoes and sold their product to french fry processors or through the russet tablestock markets. Shifts in consumer preferences and changes in the economics of producing and selling potatoes have created new marketing opportunities. These opportunities may take the form of producing new varieties for traditional markets or selling to altogether new markets.

Several factors influence the attractiveness of growing new varieties or producing for alternate markets. The most important is price advantage, which must be sufficient to offset the cost and inconvenience of establishing sales for a new variety or servicing a new market. Other important factors are market acceptance of a new variety, market location and shopping costs, and either positive or negative changes in production and storage costs that come with any shift in market or variety.

Currently, the markets available to Idaho growers include french fry processing, long-russet tablestock, chipping, and the specialty markets. Specialty potatoes include red-skinned, yellow-fleshed, and heritage varieties. Varieties commonly used in each market category are listed in Table 1.

Table 1. Varieties commonly used in each of the potato market categories.

French Fry Processing	Long-Russet Tablestock	Chipping	Reds	Yellow Flesh
Russet Burbank	Russet Burbank	Chipeta	Dark Red Norland	Yukon Gold
Shepody	Russet Norkotah	Gemchip	Red Ruby	European Varieties
Ranger Russet	Gem Russet	NorValley	IdaRose	
Gem Russet	Umatilla Russet	Snowden		
Umatilla Russet	Bannock Russet	Frito-Lay varieties		
Bannock Russet	Frontier Russet			
Frontier Russet				

Each market provides both advantages and disadvantages to a grower. The traditional french fry and russet tablestock markets will continue to be the major markets in the foreseeable future. Consequently, these markets can absorb large quantities of potatoes and buyers are relatively easy to find. Contracts are common in these markets. On the

negative side, prices in these markets are volatile and subject to depression due to oversupply. In many seasons, selling into these markets is not profitable for growers.

The chipping market can provide more stable profits than the traditional markets. Virtually all chipping potatoes grown in Idaho are sold on contract. However, access to this market is limited and buyers tend to favor growers or groups of growers who can supply large quantities of potatoes.

The red and specialty markets can often be the most lucrative of the potato markets. Additionally, prices are often not coupled with traditional markets, allowing prices to be high in otherwise depressed years. Unfortunately, these markets tend to be small and are easily flooded. It can also be difficult to make contact with buyers. However, because suppliers to these markets are few in number, buyers are often willing to provide stable contracts to ensure a stable supply.

Alternate varieties, in addition to giving growers access to new markets, can also provide economic advantages in the traditional french fry processing and russet tablestock markets. This can be illustrated by economic analysis of fresh market returns for new russet varieties in comparison with Russet Burbank. In 1995, Russet Burbank, Gem Russet, and A84118-3 were grown in Idaho trials at Shelley, Raft River, and Parma. Tubers from the trials were graded and weighed, and then packout was determined. Table 2 gives the average yield and percent U.S. No. 1's for the varieties in these trials, and Table 3 the percentage of tubers in each market pack category. A five-year (1992-1996) average price for each pack was used to calculate a gross return/cwt. Packaging costs (estimated at \$3.50/cwt) were subtracted to leave a net grower return/cwt (Table 4). The net return was multiplied by the yield and production costs (estimated at \$1965.00/A) subtracted to give net return/acre (Table 4). This value was then multiplied by 500 acres to provide total profits on an operation of this size (Table 4).

Table 2. Yield and percent U.S. No. 1's for three varieties grown in 1995 at Shelley, Raft River, and Parma, ID.

Variety	Yield (cwt/A)	U.S. No. 1's (%)
Russet Burbank	332	58
Gem Russet	369	80
A84118-3	355	76

Table 3. Percentage of tubers in three fresh pack market categories of three russet varieties grown at three locations in Idaho in 1995.

Variety	Cartons	Consumer Bags	Process and U.S. No. 2
Russet Burbank	41	16	42
Gem Russet	59	20	21
A84118-3	53	23	24

Table 4. Grower returns for three varieties based on 5-year average prices (1992- 1996).

Variety	\$ Return/cwt.	Return/A	Profit on 500 acres
Russet Burbank	\$7.33	\$469	\$234,280
Gem Russet	\$9.67	\$1603	\$801,615
A84118-3	\$8.71	\$1127	\$563,500

In this analysis, Russet Burbank provided a grower return of \$7.33/cwt. Gem Russet returned \$9.67, and A84118-3 returned \$8.71/cwt. The higher price for the two new russet varieties was a result from their ability to place a higher percentage of potatoes in cartons and a lower percentage in process grade, giving the crop an overall higher value. The higher return resulted in profits 3 to 4 times higher for Gem Russet than for Russet Burbank (Table 4).

This economic analysis was repeated using December 1998 prices to determine the benefit of these new varieties in a low-price situation (Table 5). As expected, grower returns were lower for all three varieties. Russet Burbank returned \$4.31/cwt. Because this return is below production costs, the result was a substantial net loss. Gem Russet, on the other hand, returned \$6.69/cwt and resulted in a substantial profit. A84118-3 was intermediate.

Table 5. Grower returns for three varieties based on December 1998 prices.

Variety	\$ Return/cwt.	Return/A	Profit (Loss) on 500 acres
Russet Burbank	\$4.31	(\$534)	(\$267,040)
Gem Russet	\$6.69	\$504	\$251,805
A84118-3	\$6.06	\$186	\$93,150

The two new varieties, Gem Russet and A84118-3, slightly out yielded Russet Burbank in the 1995 trials. Because these varieties are expected to produce similar yields, it was decided to repeat the calculations a third time using an average yield value for the three varieties, and again using December 1998 prices. The results are found in Table 6. Although averaging the yield tended to bring the margin between varieties closer, Russet Burbank still produced a substantial loss and the new varieties substantial gains. This showed that the advantage for the new varieties is in superior packout rather than higher yield.

Table 6. Grower returns for three varieties based on December 1998 prices using an average yield value (352 cwt/A).

Variety	\$ Return/cwt.	Return/A	Profit (LOSS) on 500 acres
Russet Burbank	\$4.31	(\$448)	(\$224,000)
Gem Russet	\$6.69	\$390	\$195,000
A84118-3	\$6.06	\$168	\$84,000

As with the fresh market, an advantage can be shown for new varieties used in french fry processing. In 1988 and 1989, a seed spacing study was conducted with Russet Burbank, Frontier Russet, and Ranger Russet. One aspect of the study was to determine net returns for the three varieties at each spacing. A by-product of the study was the ability to compare the varieties for their profitability.

A base control price of \$4.50/cwt was used for the study. Typical incentives were added for percentage of U.S. No. 1's and for potatoes over 10 oz. No incentives were added for specific gravity. Net returns were calculated by multiplying price times yield and subtracting production costs. The result was that, regardless of seed-piece spacing, Frontier Russet and Ranger Russet returned greater profits than Russet Burbank (Figure 1). Ranger Russet returns were nearly twice as high as those for Russet Burbank.

In addition to showing profits through conformity to market requirements, many new varieties have the potential to increase profits through reducing inputs. As an example, early indications are that A84118-3 will need 40% less nitrogen than Russet Burbank. Using a state average of 210 pounds N/A, and a price for ammonium nitrate of \$168/T, this will provide a savings of about \$18.00/A. On 500 acres, this comes to \$9,000. Many of the new varieties have the potential to provide these types of savings for many traditional inputs. They are resistant to many of the stress, disease, and insect problems that afflict Russet Burbank and may allow growers to reduce irrigation, fertilizer, and pesticides.

In summary, adoption of new varieties and new markets is not necessarily appropriate for every operation. The market place will not be able to shift fast enough to provide everyone a new opportunity. However, it may be profitable for growers to aggressively pursue such opportunities when they become available. Diverging into new markets can provide the advantages of diversifying into new crops, without the startup investment. Additionally, new varieties can conform better to the specifications of traditional markets allowing the grower to profit even when prices are low.

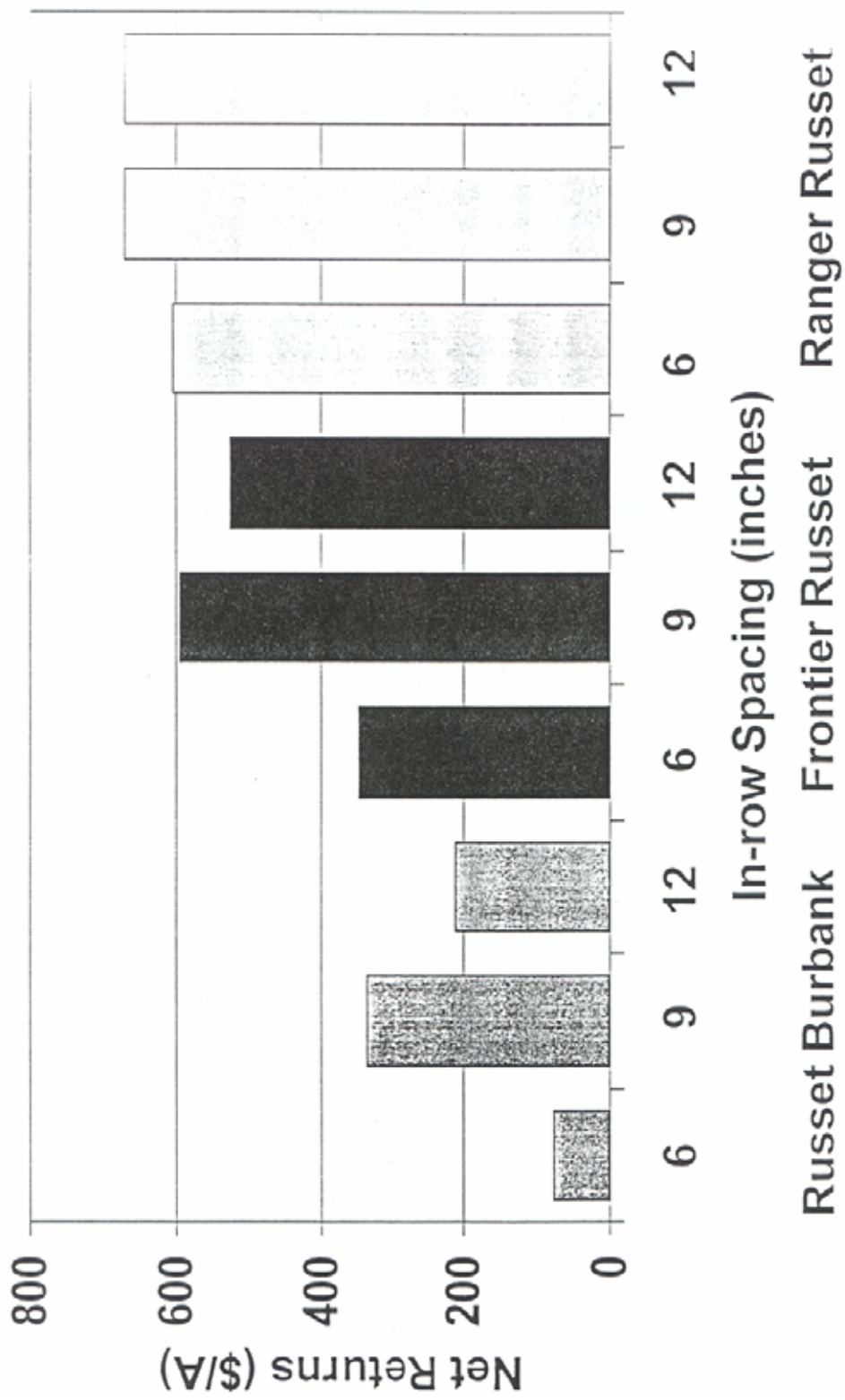


Figure 1. Net returns/acre for three varieties at each of three seed piece spacings.