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*Heavy test weight*

*Excellent milling and  
baking qualities*



South Dakota State University  
Agricultural Experiment Station  
U.S. Department of Agriculture



HARD RED SPRING WHEAT

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Exceptional bushel weight, clean threshing, good bread-making quality, and tolerance to scab are the most significant features of 'Ingot' hard red spring wheat. An "ingot" is a bar of gold or silver; the variety name marks Ingot as having heavy test weight along with its excellent milling and baking qualities.

The South Dakota Agricultural Experimental Station (SDAES) released Ingot in 1998. Certified seed is available for the 2000 season. Application for U.S. Plant Variety Protection under Title V has been made, requiring seed of Ingot be sold only as a class of certified seed.

### Origin

Ingot is an F4 derived line from the cross 'SD3080'/'Dalen' made in 1989. SD3080 is a SDAES experimental line with both 'Butte' and 'Butte 86' in its pedigree. Dalen is a 1991 release from AgriPro. The F1 plants of Ingot were grown at Yuma, Ariz., during the winter of 1990-1991. Individual F2 plant selections were made at Brookings in 1991 and later grown in Yuma the following winter (1991-92) as plant rows. The plant rows in Arizona were harvested as rows and used to plant F2:4 yield trials and a space-planted nursery at Brookings in 1992. Based on yield trial data, individual plants were chosen within the selected populations. Populations were selected based on grain yield, test weight, and bread-making characteristics. Individual plants were visually selected for resistance to prevalent foliar pathogens, namely leaf rust and stem rust.

Plant rows were grown in Yuma during the winter (1992-93), and F4:6 yield trials were conducted at Brookings in 1993. Based on yield performance and disease resistance, the line was promoted to first-year replicated yield trials in 1994 with an experimental designation of SD3249. Seed was increased by the South Dakota Spring Wheat Breeding program from 1994 through 1996. Breeders' seed was produced in 1996, and Foundation seed was produced in 1997 with release to Class I growers for planting in 1998.

### Agronomic characteristics

The most significant features of Ingot are its very high test weight, good bread-making quality, and tolerance to scab. It has been in South Dakota crop performance trials since 1995 and in the Uniform Regional Spring Wheat Nursery since 1996. It was tested by the Wheat Quality Council in 1997.

Compared to Butte 86, Ingot is similar in grain yield, heads one day earlier, stands slightly taller, is 2 pounds/bushel higher in test weight, and is slightly higher in protein.

In South Dakota the performance of Ingot relative to other popular varieties is dependent on the amount of Fusarium head scab in a given year. If there is little or no scab pressure, Ingot yields are similar to Butte 86, 'Sharp,' and '2375,' but about 2 to 4 bushels/acre less than 'Russ' and 'Oxen.' Under these conditions Ingot will still weigh about 1 to 2 pounds more in test weight than these popular varieties. If there is high scab pressure, Ingot will tend to outyield Butte 86, Sharp, and 2375 and be similar in yield to Russ and Oxen. In this case, Ingot will again still tend to be heavier in test weight.

Although Ingot may yield slightly less or be equal in yield to other varieties across a wide range

Table 1. Origin, disease reaction, and other traits of Ingot compared to other popular spring wheat varieties.

Variety	Origin -yr	Stand- ability	Disease reaction			1998 Baking rating
			Leaf rust	Stem rust	Fusarium head blight	
<b>Ingot*</b>	<b>SD-98</b>	<b>GOOD</b>	<b>MS</b>	<b>R</b>	<b>M#</b>	<b>Good</b>
Butte 86	ND-86	FAIR	MR+	R+	MS+	Fair
Oxen*	SD-96	GOOD	MR	R	MS#	VGood
Russ*	SD-95	GOOD	R	R	MS#	Good
Sharp	SD-90	GOOD	MR	R	MS#	Fair
2375*	NDSURF-88	GOOD	MS	MR	MS#	Good

\* Plant variety protection (PVP) - To be sold by variety name only as a class of certified seed.

+ R=resistant, MR=moderately resistant, M=intermediate, MS=moderately susceptible, S=susceptible.

# These varieties have consistently shown tolerance to head blight in grain yield and quality.

of environments, it will consistently exhibit a higher test weight while affording growers the added advantage of a variety having a greater tolerance to head scab and good end-use quality.

Ingot is early in maturity. Days from planting to heading are equal to Forge and a day earlier than Butte 86. Ingot plant height is 1 to 2 inches taller than Butte 86. Straw strength is similar to Butte 86 and Sharp. Although Ingot threshes easily, shattering has not been observed.

Ingot is resistant to prevalent races of stem rust and is moderately susceptible to leaf rust and the leaf spotting diseases. Ingot is more tolerant to Fusarium head scab than Butte 86, Sharp, or 2375 but less than 'BacUp,' a variety released by Minnesota Agriculture Experiment Station in 1996.

The grain of Ingot exhibits a medium-high protein content and good milling and bread-making properties. Compared to 'Grandin,' it is higher in test weight but similar in protein content, dough strength, and baking properties.

Table 2. Agronomic performance averages (1996,1998-99) of Ingot compared to other popular spring wheat varieties.

Variety	Relative heading day	2-yr* protein pct	3-yr@ bu wt lb	3-yr@ height inch	Yield-bu/a '99 3-yr@		Top yield percentage '99 3-yr@	
<b>Ingot</b>	<b>-1</b>	<b>14.9</b>	<b>61</b>	<b>33</b>	<b>43</b>	<b>46</b>	<b>22</b>	<b>57</b>
Butte 86	0	14.5	58	32	39	44	11	29
Sharp	0	14.7	59	32	42	46	11	57
2375	2	14.5	59	29	36	43	0	14
Oxen	2	14.7	59	29	43	49	44	86
Russ	2	14.7	59	32	45	50	67	86

\* Includes years 1998-99.

@ Includes years 1996, 1998-99.

+ Percentage of time a variety appeared in the top-yield group.

Table 3. Yield comparisons of Ingot to other popular HRS wheat varieties at various locations in South Dakota.

Variety	Brookings		Watertown		Highmore		Selby		Grotton		Wall		Bison		Ralph	
	'99	3-yr@	'99	3-yr@	'99	3-yr@	99	3-yr@	'99	3-yr@	'99	3-yr@	'99	3-yr@	'99	3-yr@
<b>Ingot</b>	<b>48</b>	<b>49</b>	<b>42</b>	<b>45</b>	<b>31</b>	<b>38</b>	<b>61</b>	<b>55</b>	<b>32</b>	<b>44</b>	<b>46</b>	<b>55</b>	<b>48</b>	<b>36</b>	<b>46</b>	
Butte 86	47	49	40	42	34	41	56	51	25	38	43	43	47	30	44	
Oxen	46	48	37	42	33	41	58	58	32	45	51	56	54	39	53	
Russ	51	52	34	46	38	44	62	57	41	48	48	58	55	37	49	
Sharp	47	49	35	43	37	41	61	53	35	44	48	50	49	31	43	
2375	40	45	34	39	30	40	49	51	24	38	43	49	49	26	43	
Test Avg:	43	46	33	40	34	40	59	54	31	42	45	51	49	34	46	

@ Includes years 1996, 98-99.

