

Analysis of the 1982 Wheat Objective Yield
Research Project

Dave Aune
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The Yield Assessment Section (YAS) analysis of the Wheat Objective Yield (WOY) survey data shows that the weight of grain threshed from a subsample of emerged heads is not a better forecast variable than total weight per head. Furthermore, the workload in the State labs is increased substantially. Therefore, YAS recommends that weight of threshed grain be eliminated from the monthly WOY lab work.

State lab procedures for the 1982 WOY were amended to obtain the weight of grain threshed from a subsample of emerged heads. The additional data were requested by YAS to investigate the possibility of using threshed grain weight as a forecast variable instead of total weight per head for samples in the milk or soft dough stage (codes 4 and 5). Data Collection Branch (DCB) placed the data item on the Form C-1 as Item 2-f (cell code 412). A copy of the Form C-1 is attached.

The premise for the original proposal was that State labs had to thresh the subsample of emerged heads to obtain the count of grains needed to complete Item 2e. Since the heads were already threshed, virtually no additional cost would be incurred from the extra measurement. This premise is not true. States are encouraged to use a microthresher, but they may count the grains on the head when threshing would grind or crush the kernels. Threshing is not advised for heads in the milk stage. If threshed grain weight improved forecasting ability, several other measurements could be dropped from the Form C-1.

The analysis examined models using the current forecast variable, total weight per head, and new models comparably developed using threshed grain weight per head. Total weight per head is defined as the total lab weight of all emerged and late boot heads (Items 2b, 3a, and 3b) divided by the count of heads weighed. The data set was partitioned by State and maturity stage within State. Within each partition, a least-squares regression equation was calculated for both models.

The table presents the sample sizes and r-square values for both models in each partition. In maturity stage 4, the r-square values of the new models exceed those of the old models in 2 of the 14 states that submitted data. In maturity stage 5, the new model r-squares were larger in 2 of the 17 states. In the four cases for which the new model r-square was higher, the sample sizes were small (ranging from 9 to 18). Scatter digrams, plotting each independent variable against final grain weight per head, were used to look for extreme data values. Potential outliers found in the plots of weight of threshed grain per head also appear as outliers in the comparable plot of total weight per head.

Sample sizes and r-squares for new and old forecast models
by State and maturity stage.

State	Stage 4			Stage 5		
	<u>1</u> /n	<u>2</u> /new r ²	<u>3</u> /old r ²	n	new r ²	old r ²
Colorado	22	.298	.595	34	.270	.453
Idaho	-	-	-	84	.440	.544
Illinois	11	.027	.097	16	.019	.287
Indiana	9	.613	.382	18	.580	.260
Kansas	23	.289	.505	115	.385	.544
Michigan	18	.153	.413	15	.109	.069
Minnesota	12	.177	.380	22	.570	.723
Missouri	14	.007	*	34	.348	.440
Montana	75	.176	.335	60	.084	.281
Nebraska	43	.149	.298	39	.149	.304
North Dakota	74	.225	.316	38	.728	.762
Ohio	30	.481	.642	30	.123	.279
Oklahoma	54	*	.168	80	.087	.113
Oregon	-	-	-	56	.446	.573
South Dakota	16	.069	.079	19	.540	.728
Texas	49	.075	.164	40	.418	.457
Washington	-	-	-	42	.262	.315

* less than .001

1/ Sample size. Idaho, Oregon and Washington did not submit data for Stage 4.

2/ R-square value for model using total weight per head as dependent variable.

3/ R-square value for model using weight of threshed grain per head as dependent variable.

The recommendation that the weight of the threshed grain be removed is made for three reasons.

1. For both of the maturity stages considered, the new models, developed from the weight of threshed grain, are poorer than the model currently used. Although we are usually reluctant to form a decision on one crop year's data, the absence of any encouraging signs supports termination of the experiment.
2. The premise that the heads must be threshed to obtain a kernel count is false. The additional work required to determine grain weight is substantial for heads in the milk stage. No useful purpose is served by forcing State labs to thresh heads in the milk or soft dough stage, solely to obtain grain weight.
3. Not all States are equipped with microthreshers. A review of DCB annual inventory sheets shows that 7 of the 17 WOY States so not have a microthresher. These States would even have to thresh heads in the soft dough stage.

The procedure used to obtain the weight of threshed grain is not practical. The ability to use a microthresher makes the procedure more realistic, but not all State labs are equipped with microthreshers. We feel that a new forecast variable should show considerable promise to justify the amount of extra work needed for this project.

FORM C-1: STATE LABORATORY DETERMINATIONS—
1982 WHEAT YIELD SURVEY - CLIPPING AREA
SINGLE ROW HEAD SAMPLES

YEAR, CROP, FORM, MONTH (1-4)	
2_4	

CROP CODE
 Winter..... 1
 Spring (Other than Durum)..... 6
 Durum..... 7

Date _____ **470**
 (Sample Processed)

1. From Identification Tag

	UNIT 1	UNIT 2	Total
a. All Heads (Emerged and Late Boot)Number			401
b. Stage of Maturity.....Code			402

2. Laboratory Determinations, Subsample of emerged heads (3 # Bag)

a. Heads in sample (10 or fewer) Number	403
b. Total weight of heads ... (One decimal)..... Grams	404
c. Total of fertile spikelets on head Number	405
d. Total of sterile spikelets Number	406
<i>Complete 2e for MATURITY STAGES 4 and 5 ONLY.</i>	
e. Total grains..... Number	407
f. Total weight of grains (One decimal) Grams	412

3. Laboratory Determinations on All Remaining Heads

a. Emerged Heads (8 # bag):	
(1) Total number, laboratory countNumber	410
(2) Total weight of heads. Grams	408
b. Heads in Late Boot (5 # bag):	
(1) Total number, laboratory countNumber	411
(2) Total weight of late boot heads Grams	409

Lab Technician _____