

UPDATE ON WALNUT MOISTURE DETERMINATION

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Overdrying of walnuts continues to be a problem for walnut growers. Larry Fitch, Farm Advisor in Sutter and Yuba Counties, measured the moisture of eight loads of nuts delivered to a local processor. He found that the average moisture was 4.2% with one load at 3.0% moisture. This level of overdrying is very expensive to growers for four reasons.

1. Overdrying results in less weight sold to the processor. At this year's prices of 50¢ per pound, a grower would receive almost \$39 per ton more revenue if he shipped nuts at 8% versus 4%.
2. Overdrying increases drying time and energy use. Most growers are overdrying by 4 to 8 hours, increasing energy costs for drying by approximately \$3.80 to \$7.70 per ton.
3. Overdrying reduces capacity of the dryer. Most growers are limited in their harvest rate by drying capacity. Slow harvest can often result in reduced quality especially due to kernel darkening.
4. Overdried nuts are brittle and there is more shell breakage during handling.

Overdrying can be prevented by accurately determining the moisture content of the nuts as they are drying. An article in the August 1978 issue of Diamond Walnut News outlined four methods of moisture measurement. Two of the methods were considered accurate enough for final moisture content determination but they require too much time to obtain a reading in every day field use. In 1978, a John Deere model TY9034 moisture tester was evaluated and found that it gave very reliable moisture readings for walnuts. The device costs \$264 (1978) and gives a reading in 15 seconds.

The following tables show a correlation between whole nut moisture measured by the moisture meter and an infrared moisture balance, the industry standard: The whole nuts had to be reduced in size to fit in the meter and were thoroughly broken with a hammer or ground in a household blender. Each size reduction technique resulted in a different correlation with both correlations being accurate enough for field measurements. The ground whole nut method was the most reliable giving a reading that was within $\pm .6\%$ of the infrared balance moisture. The hammered method provided a moisture reading that was $\pm 1.3\%$ of the infrared balance reading. In each case the accuracy can be improved by determining the average of two or three moisture samples.

When using the meter, nuts from a dryer should be allowed to cool and instructions on the back of the meter followed exactly. The hammered nuts require the use of a 100 gram weight (available from the dealers). The weight must be placed on the meter before loading it with nuts and the nut pieces poured slowly into the meter until the first number appears. If more nuts are added after the first number appears and the sampling compartment is jiggled, an erroneously high number will appear on the device.

When selecting a sample of nuts from the dryer remember to take nuts from various places on top of the bin and the nuts on the top are wetter than the bottom nuts. The charts are not accurate for nut meats alone.

It is entirely possible that other grain moisture meters will also provide reliable estimates of walnut moisture. In fact, the John Deere device is manufactured by the Dickey-john Company which sells a similar device under its own name. Any meter except the two mentioned will have to be calibrated before they can be used.

CORRECTION TABLES FOR JOHN DEERE MODEL TY9304
MOISTURE TESTER (Calibrated for Corn)

Whole English Walnuts thoroughly broken with a Hammer

<u>Meter Reading</u>	<u>Actual Moisture</u>	<u>Meter Reading</u>	<u>Actual Moisture</u>
2.5	2.6	6.0	8.2
3.0	3.4	6.5	9.0
3.5	4.2	7.0	9.8
4.0	5.0	7.5	10.6
4.5	5.8	8.0	11.4
5.0	6.6	8.5	12.2
5.5	7.4	9.0	13.0

Whole English Walnuts thoroughly Ground in a Blender

<u>Meter Reading</u>	<u>Actual Moisture</u>	<u>Meter Reading</u>	<u>Actual Moisture</u>
6.0	2.4	12.0	9.5
6.5	3.2	12.5	9.9
7.0	4.0	13.0	10.2
7.5	4.6	13.5	10.6
8.0	5.2	14.0	10.9
8.5	5.9	14.5	11.2
9.0	6.5	15.0	11.4
9.5	7.1	15.5	11.6
10.0	7.6	16.0	11.8
10.5	8.1	16.5	12.0
11.0	8.6	17.0	12.1
11.5	9.1		