Ag Decision Maker

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Metric Conversions

Most of the world does its measuring in meters, grams, and liters. The United States is the only major trading nation that does not use the metric system. So we often need to make conversions between our system and the metric system.

Metric units can be modified by adding a prefix to simplify expressions of very short or long units. For example, a long distance is expressed in kilometers (1,000 meters) or a short length may be expressed in millimeters (1/1,000 of a meter). Thus, all dimensions of length can be expressed as variations of a meter. Conversions between these measurements are simple decimal locations based on factors of 10.

Powers

Mega (M) = million
Kilo (k) = thousand
Hecto (h) = hundred
Deka (da) = ten

Fractions

Deci (d) = one-tenth
Centi (c) = one-hundredth
Milli (m) = one-thousandth
Micro = one-millionth

Metric conversions

Precise and approximate (in parentheses) metric conversions are in the next column. Precise conversions are used for exact technical analysis. Easy-to-remember approximate or ball-park conversions are often used in general discussion.

Length

The basic unit of length is the meter—slightly more than one yard in length. A kilometer (1,000 meters) is about .6 of a mile. So a distance of 100 kilometers is about 60 miles. A speed of 100 kilometers per hour is about 60 miles per hour. A centimeter (one-hundredth of a meter) is slightly less than one-half of an inch.

1 meter (m) = 1.094 (1.1) yard
1 meter = 39.37 (40) inches
1 meter = 3.281 (3.3) feet
1 yard = .9144 (.9) meters

1 kilometer (km) = .6214 (.6) miles
1 mile = 1.609 (1.6) kilometers

1 centimeter (cm) = .3937 (.4) inches
1 inch = 2.54 (2.5) centimeters
1 foot = 30.48 (30) centimeters

Surface

The basic metric unit of land area measurement is a square with each side 100 meters long, covering an area of 10,000 square meters. This unit of land is called the hectare (ha) and is equal to approximately 2.5 acres.

1 square meter (sq m) = 1.196 (1.2) square yards
1 square yard = .8361 (.8) square meters

1 hectare (ha) = 10,000 square meters
1 hectare (ha) = 2.471 (2.5) acres
1 acre (a) = 4,046.86 square meters
1 acre = .4047 (.4) hectares

1 square kilometer (sq km) = .3861 (.4) square miles
1 square kilometer = 100 hectares
1 square kilometer = 247.1 (250) acres
1 square mile = 2.590 (2.6) square kilometers
1 square mile = 259 (260) hectares

Volume (capacity)

The basic unit of volume in the metric system is a cube, 10 centimeters on each side. Contained in this cube are 1,000 cubic centimeters or one liter. A liter contains slightly more liquid than a quart. Very large volumes may be measured in cubic meters (1 cubic meter = about 264 gallons).

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Liquid Measure

1 liter = 1.057 (1) quart
1 quart = .9464 (1) liter
1 liter = .2642 (.25) gallons
1 gallon = 3.785 (4) liters
1 dekaliter (dal) = 2.642 (2.5) gallons

Dry Measure

1 cubic meter = 1.308 (1.3) cubic yards
1 cubic yard = .7646 (.76) cubic meters
1 bushel = 1.244 (1.25) cubic feet
1 bushel = .0352 (.035) cubic meters
1 cubic meter = 28.38 (30) bushels

Weight

Weight (or more technically accurate, mass) in the metric system is measured in kilograms (kg). One kilogram equals about 2.2 pounds. A gram (1/1,000 kilogram is approximately the weight of a paper clip), and is used for making very small measurements. One liter of water weighs one kilogram at sea level.

1 kilogram (kg) = 2.205 (2.2) pounds
1 pound = .4536 (.45) kilograms

1 quintal (q) = 220.5 (220) pounds
1 quintal = 100 kilograms

1 metric ton (MT or t) = 2,204.62 (2200) pounds
1 metric ton = 1,000 kilograms
1 metric ton = 10 quintals

1 metric ton = 1.102 (1.1) tons
1 ton = .9072 (.9) metric tons

1 ton (long) = 1.12 ton (short) (U.S.)
1 ton (short) (U.S.) = .8929 ton (long)

1 bushel corn (56#) = 25.40 (25) kilograms
1 bushel wheat/soybeans (60#) = 27.22 (27) kilograms

1 quintal = 3.937 (4) bushels corn (56# bu)
1 quintal = 3.674 (3.7) bushels wheat/soybeans (60# bu)
1 metric ton = 39.37 (40) bushels corn (56# bu)
1 metric ton = 36.74 (37) bushels wheat/soybeans (60# bu)

Temperature

Temperature is measured in the Celsius (C) scale. The temperature at which water freezes is 0° and is equivalent to 32° F (Fahrenheit). A reading of 37° on the Celsius scale is the approximate equivalent to human body temperature (98.6° F) and water boils at 100° C (212° F).

$C = (F-32) \times {}^{5}/_{9}$ $F = {}^{9}/_{5}\,C + 32$

F		C
425	=	218.33
350	=	176.67
100	=	37.78
70	=	21.11
32	=	0
0	=	-17.78

Yields

1 U.S. ton per acre = 2.24 metric tons per hectare
1 U.S. ton per acre = 2.47 U.S. tons per hectare
1 metric ton per hectare = .446 U.S. tons per acre
1 metric ton per hectare = .405 metric tons per acre
1 metric ton per hectare = 892 pounds per acre
1 metric ton per hectare = 100 grams per square meter

Grain yields

Some of our traditional terms are more complicated to convert from one system to another. Grain yields for example are conventionally expressed in terms of volume per acre (bu/a). In the metric system, yield is given by weight (kilograms per hectare).

A corn yield of 200 bushels per acre is first expressed by weight (200 bu @ 56 lb/bu = 11,200 lbs) and then converted to kilograms (11,200 lbs * .4536 kg/lb = 5,080 kg). Because a hectare is equal to 2.471 acres, it means that 200 bu/ac is equal to about 12,553 kg/ha (5,080 kg/ac x 2.471 ac/ha = 12,553 kg/ha). This translates into 126 quintals per hectare and 12.55 metric tons per hectare.

Corn (56# bu)

1 kilogram/hectare (kg/ha) = .0159 (.016) bushels/acre
1 bushel/acre = 62.77 (63) kilograms/hectare

1 quintal/hectare (q/ha) = 1.593 (1.6) bushels/acre
1 bushel/acre = .6277 (.63) quintals/hectare
1 metric ton/hectare (MT/ha) = 15.93 (16) bushels/acre
1 bushel/acre = .0628 (.06) metric tons/hectare

Wheat/soybeans (60# bu)

1 kilogram/hectare (kg/ha) = .0149 (.015) bushels/acre
1 bushel/acre = 67.25 (67) kilograms/hectare

1 quintal/hectare = 1.487 (1.5) bushels/acre
1 bushel/acre = .6725 (.67) quintals/hectare

1 metric ton/hectare = 14.87 (15) bushels/acre
1 bushel/acre = .0673 (.07) metric tons/hectare

Rate

Application rates are often given in weight of material per unit of area covered (pounds per acre) or volume of material per unit of area covered (quarts per acre).

1 kilogram/hectare (kg/ha) = .8922 (.9) pounds/acre
1 pound/acre = 1.121 (1.1) kilograms/hectare

1 liter/hectare (L/ha) = .4276 (.4) quarts/acre
1 quart/acre = 2.338 (2.3) liters/hectare

Prices

To compare agricultural commodity prices in different countries, conversions often need to be made between the U.S. system and the metric system. When converting livestock prices (see Table 1), the basic conversion is based on converting pounds to kilograms. When converting grain prices (see Table 2) the conversion must be based on the weight of a bushel of grain.

Table 1. Livestock prices.

$/cwt[1]	$/lb[2]	$/kg[3]	$/MT[4]
$30	0.30	0.66	661
35	0.35	0.77	772
40	0.40	0.88	882
45	0.45	0.99	992
50	0.50	1.10	1102
55	0.55	1.21	1213
60	0.60	1.32	1323
65	0.65	1.43	1433
70	0.70	1.54	1543
75	0.75	1.65	1653
80	0.80	1.76	1764
85	0.85	1.87	1874
90	0.90	1.98	1984
95	0.95	2.09	2094
100	1.00	2.20	2205

(see legend below)

Table 2. Grain prices.

56 pound bushel

$/bu[5]	$/lb[2]	$/kg[3]	$/MT[4]
$2.00	0.036	0.079	79
2.50	0.045	0.098	98
3.00	0.054	0.118	118
3.50	0.063	0.138	138
4.00	0.071	0.157	157
4.50	0.080	0.177	177
5.00	0.089	0.197	197
5.50	0.098	0.217	217
6.00	0.107	0.236	236
6.50	0.116	0.256	256
7.00	0.125	0.276	276
7.50	0.134	0.295	295
8.00	0.143	0.315	315
8.50	0.152	0.335	335
9.00	0.161	0.354	354

60 pound bushel

$/bu[5]	$/lb[2]	$/kg[3]	$/MT[4]
$2.00	0.033	0.073	73
3.00	0.050	0.110	110
4.00	0.067	0.147	147
5.00	0.083	0.184	184
6.00	0.100	0.220	220
7.00	0.117	0.257	257
8.00	0.133	0.294	294
9.00	0.150	0.331	331
10.00	0.167	0.367	367
11.00	0.183	0.404	404
12.00	0.200	0.441	441
13.00	0.217	0.478	478
14.00	0.233	0.514	514
15.00	0.250	0.551	551
16.00	0.267	0.588	588

1. $ per hundred weight
2. $ per pound
3. $ per kilogram
4. $ per metric ton
5. $ per bushel

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