Wind

PART II

SECTION C

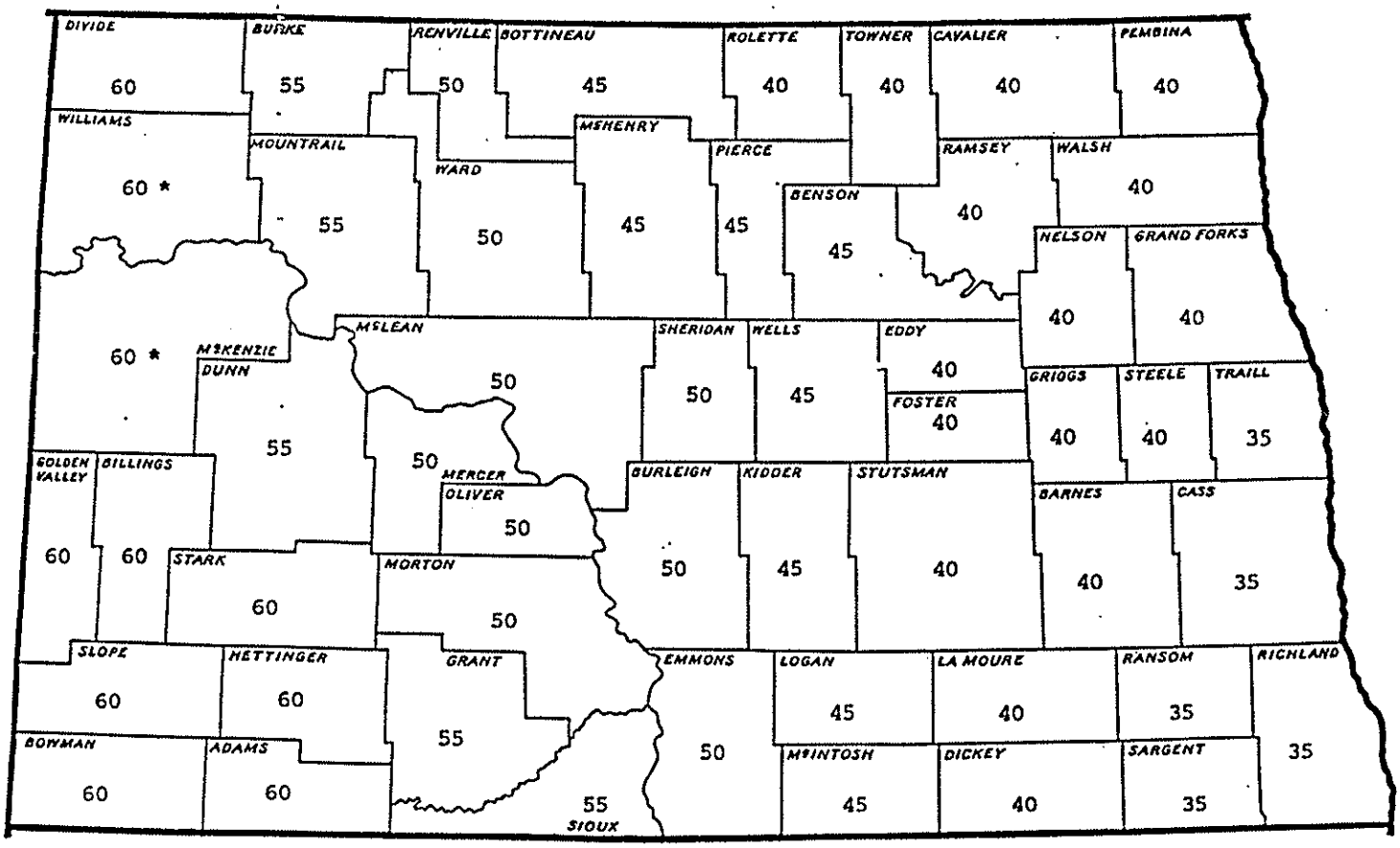
APPENDIX

The following section contains the maps for climatic value, prevailing wind erosion direction, tables for soil erodibility, knoll erodibility, ridge roughness, estimating residue, residue reduction, the Flat Small Grain Equivalent (SGe) charts and the "E" tables.

FIGURE 1

"C" CLIMATIC FACTORS

NORTH DAKOTA



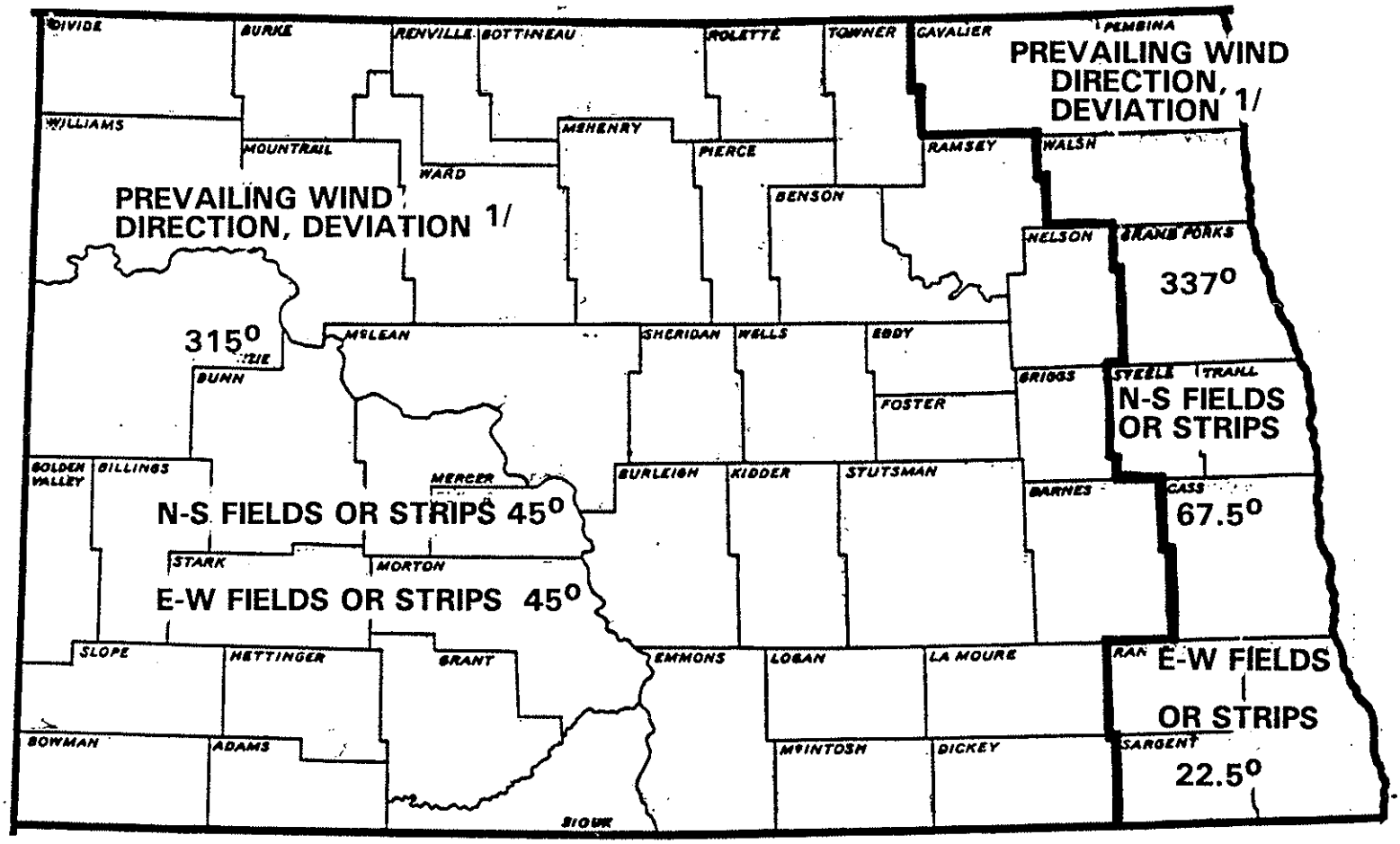
* Climatic Factor C = 50 is assigned to the Yellowstone Valley and to the Missouri Valley upstream of Lake Sakakawea.

WIND EROSION CLIMATIC FACTORS "C"

FIGURE 2

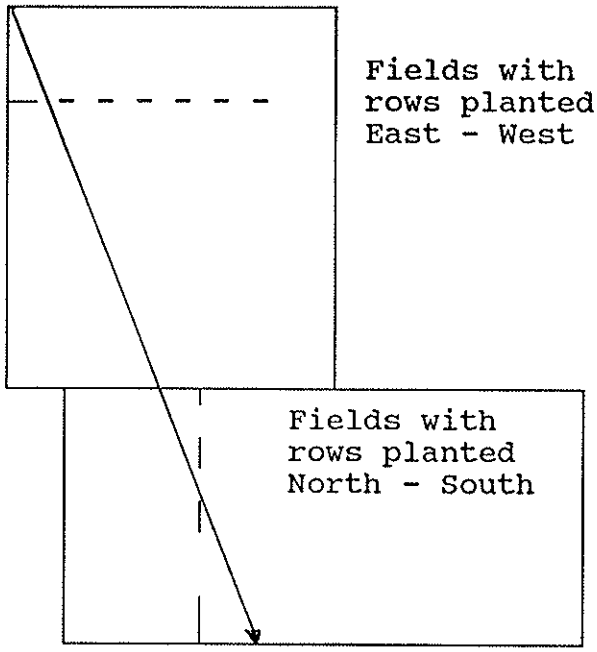
PREVAILING WIND EROSION DIRECTION AND DEVIATION

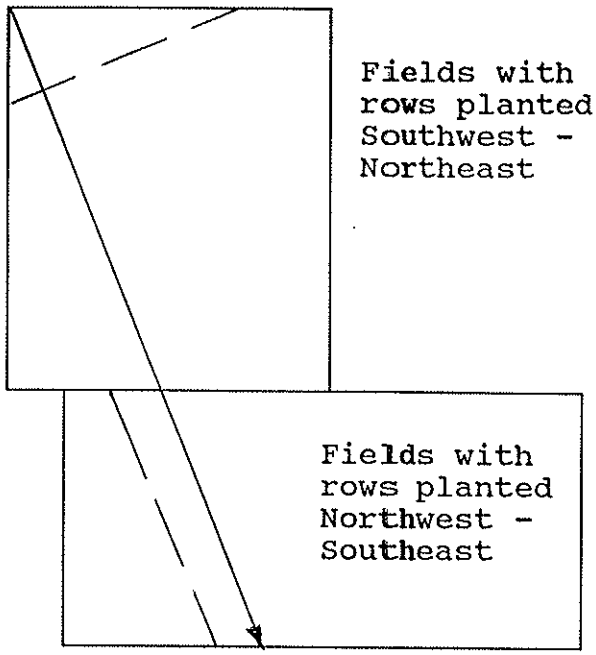
NORTH DAKOTA



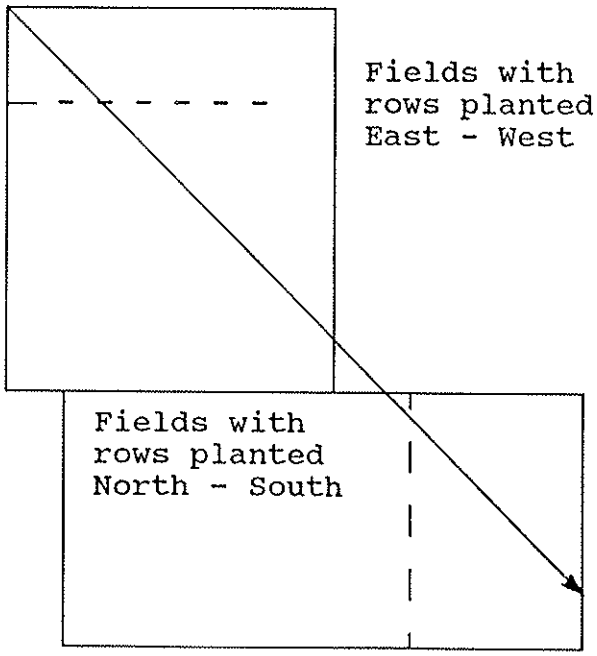
1/ The angle of deviation is the angle between prevailing wind erosion direction and a line perpendicular (1) to the long side of the field or strip, when determining unsheltered distance using a wind erosion direction factor, or (2) to row direction when determining effect of wind direction on the ridge roughness factor. The use of the measuring scale will provide the correct measured "L."

The diagrams below are examples of the angle of deviation when the row direction is oriented as indicated for wind erosion direction of 337^{0}





The diagrams below are examples of the angle of deviation when the row direction is oriented as indicated for wind erosion direction of 315^{0}



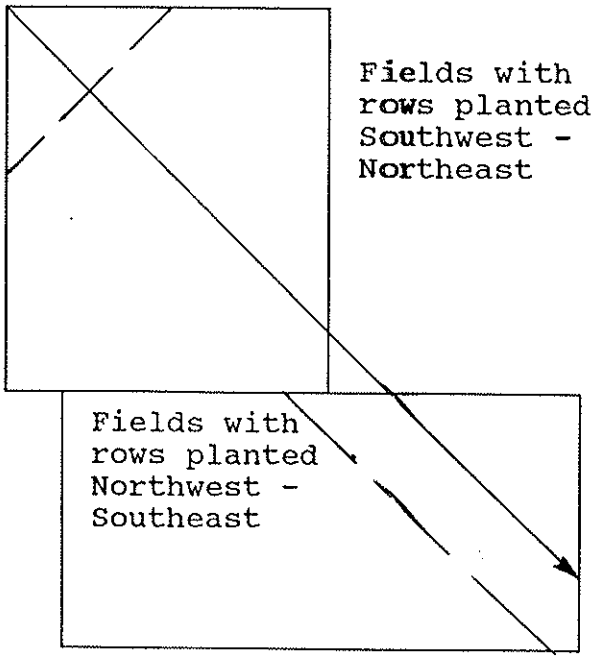


TABLE 1

Wind Erodibility Group (WEG)	Predominant Soil Texture Class of Surface Layer	Index "I" T/Ac/Yr 1/	Soil Ridge Roughness "K" Value Parameters Expected 2/	Known 3/
1	Very fine sand, fine sand, sand, or coarse sand.	The "I" value is found in FOTG, Section II, Cropland Interpretations, on pages with header labeled Cropland Interpretations for Erosion Predictions	1.0	
2	Loamy very fine sand, loamy fine sand, loamy sand, loamy coarse sand, or sparic organic soil materials.		1.0	
3	Very fine sandy loam, fine sandy loam, sandy loam, or coarse sandy loam.		1.0	
4	Clay, silty clay, noncalcareous clay loam, or silty clay loam with more than 35 percent clay.		0.8	
4L	Calcareous loam and silt loam, or calcareous clay loam and silty clay loam.		0.8	
5	Noncalcareous loam and silt loam with less than 20 percent clay, or sandy clay loam, sandy clay, and hemic organic soil materials.		0.7	
6	Noncalcareous loam and silt loam with more than 20 percent clay, or noncalcareous clay loam with less than 35 percent clay.		0.7	
7	Silt, noncalcareous silty clay loam with less than 35 percent clay, and fibric organic soil material.		0.5	
8	Soils not susceptible to wind erosion due to coarse fragments or wetness, wind erosion not a problem.	--	---	

1/ The soil erodibility index is based on the relationship of dry soil aggregates greater than .84mm to potential soil erosion.

2/ Default "K" is usually expected on this soil at the wind erosion period. Select "K" from this column when actual field condition is not known or predictable.

3/ Select "K" from Table 3 on Pages A-6 and A-7 that correspond to the angle of deviation, ridge height, and ridge spacing when actual field condition is known.

TABLE 2

KNOLL ERODIBILITY ADJUSTMENT FACTOR FOR "I"	
Slope Change in Prevailing Wind Erosion Direction	COLUMN A Knoll Adjustment to "I" 1/
3	1.3
4	1.6
5	1.9
6	2.3
8	3.0
10	3.6
10 - 15 *	2.0
15 - 20 *	1.4
20+ *	1.0

* Factors above 10 percent slope change based on SCS judgement. No research data available.

1/ After the knoll adjustment has been made, use the nearest available value for "I" in Table 1.

TABLE 3

RIDGE ROUGHNESS "K" FACTOR

Angle of Deviation 1/ = 0°

Ridge Spacing (Inches)	Ridge Height (Inches) 0	1	2	3	4	5	6	7	8	9	10	11
7	1.0	0.7	0.5	0.5	---	---	---	---	---	---	---	---
10	1.0	0.8	0.5	0.5	0.6	---	---	---	---	---	---	---
14	1.0	0.8	0.6	0.5	0.5	0.6	---	---	---	---	---	---
18	1.0	0.9	0.6	0.5	0.5	0.5	0.7	---	---	---	---	---
20	1.0	0.9	0.6	0.5	0.5	0.5	0.6	0.8	0.8	---	---	---
24	1.0	0.9	0.7	0.5	0.5	0.5	0.5	0.7	0.8	0.8	---	---
30	1.0	0.9	0.7	0.6	0.5	0.5	0.5	0.6	0.7	0.8	---	---
36	1.0	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.7	0.8	---
38	1.0	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.7	0.8	---
40	1.0	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.7	0.8	0.8

TABLE 3

RIDGE ROUGHNESS "K" FACTOR

Angle of Deviation 1/ = 22.5°

Ridge Spacing (Inches)	Ridge Height (Inches) 0	1	2	3	4	5	6	7	8	9	10	11
7	1.0	.07	.05	.05	---	---	---	---	---	---	---	---
10	1.0	0.8	0.6	0.5	0.5	---	---	---	---	---	---	---
14	1.0	0.8	0.6	0.5	0.5	0.6	---	---	---	---	---	---
18	1.0	0.9	0.6	0.5	0.5	0.5	0.6	---	---	---	---	---
20	1.0	0.9	0.7	0.5	0.5	0.5	0.6	0.7	0.8	---	---	---
24	1.0	0.9	0.7	0.6	0.5	0.5	0.5	0.6	0.8	0.8	---	---
30	1.0	0.9	0.7	0.6	0.5	0.5	0.5	0.5	0.7	0.8	---	---
36	1.0	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.7	0.8	---
38	1.0	1.0	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.6	0.8	---
40	1.0	1.0	0.8	0.6	0.6	0.5	0.5	0.5	0.5	0.6	0.7	0.8

1/ The angle between the prevailing wind erosion direction and a line perpendicular to ridge direction.

TABLE 3

RIDGE ROUGHNESS "K" FACTOR

Angle of Deviation 1/ = 45°

Ridge Spacing (Inches)	Ridge Height (Inches) 0	1	2	3	4	5	6	7	8	9	10	11
7	1.0	0.8	0.5	0.5	---	---	---	---	---	---	---	---
10	1.0	0.8	0.6	0.5	0.5	---	---	---	---	---	---	---
14	1.0	0.9	0.6	0.5	0.5	0.5	---	---	---	---	---	---
18	1.0	0.9	0.7	0.6	0.5	0.5	0.5	---	---	---	---	---
20	1.0	0.9	0.7	0.6	0.5	0.5	0.5	0.6	0.7	---	---	---
24	1.0	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.8	---	---
30	1.0	1.0	0.8	0.6	0.5	0.5	0.5	0.5	0.5	0.6	---	---
36	1.0	1.0	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.6	0.6	---
38	1.0	1.0	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.6	---
40	1.0	1.0	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.7

TABLE 3

RIDGE ROUGHNESS "K" FACTOR

Angle of Deviation 1/ = 67.5°

Ridge Spacing (Inches)	Ridge Height (Inches) 0	1	2	3	4	5	6	7	8	9	10	11
7	1.0	0.9	0.6	0.5	---	---	---	---	---	---	---	---
10	1.0	0.9	0.7	0.6	0.5	---	---	---	---	---	---	---
14	1.0	0.9	0.8	0.6	0.6	0.5	---	---	---	---	---	---
18	1.0	1.0	0.8	0.7	0.6	0.5	0.5	---	---	---	---	---
20	1.0	1.0	0.8	0.7	0.6	0.5	0.5	0.5	0.5	---	---	---
24	1.0	1.0	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.5	---	---
30	1.0	1.0	0.9	0.8	0.6	0.6	0.5	0.5	0.5	0.5	---	---
36	1.0	1.0	0.9	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.5	---
38	1.0	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.5	---
40	1.0	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5

1/ The angle between the prevailing wind erosion direction and a line perpendicular to ridge direction.

TABLE 3

RIDGE ROUGHNESS "K" FACTOR

Angle of Deviation 1/ = 90°

Ridge Spacing (Inches)	Ridge Height (Inches) 0	1	2	3	4	5	6	7	8	9	10	11
Soil ridge roughness, "K" Factor, is always 1.0 when prevailing wind direction is parallel to ridge pattern (angle of deviation = 90°).												

Table 4, Estimating Residues, lists the approximate residue produced by various crops. Table 5, Residue Types, lists the types of residue, nonfragile or fragile. Table 6, Residue Reduction, lists residue reducing type activities and the percent of residue estimated to remain after the designated activity. These two tables are needed to determine the amount of residue on the field during the critical wind erosion period or any other management method.

TABLE 4

ESTIMATING RESIDUE

Crop	Estimated Air Dry Residue Produced
Alfalfa	3,000 lbs./a.
Barley	80 lbs./bu.
Buckwheat	1.5 lbs./lb.
Corn	60 - 90 lbs./bu.
1/ Corn and/or Sorghum Silage	50 lbs. residue per inch of stubble height per 10,000 plants/a.
Dry Edible Beans	1.0 lbs./lb.
Field Peas	1.0 lbs./lb.
Flax	80 lbs./bu.
1/ Grain Sorghum	60 lbs./bu.
Lentils	1.0 lbs./lb.
Millet	80 lbs./bu.
Mustard	1.5 lbs./lb.
Oats	50 lbs./bu.
Rape Seed	1.5 lbs./lb.
Rye	120 lbs./bu.
Safflower	1.5 lbs./lb.
2/ Soybeans	50 lbs./bu.
Spring Wheat, Durum	100 lbs./bu.
Sugarbeets	150 lbs./ton
1/ Sunflower	2.2 lbs./lb.
Winter Wheat	120 lbs./bu.
3/ Potatoes, WEGs 1 & 2	
Irrigated, without desiccant	1,100 lbs. (575 lbs. SGe)
Irrigated, with desiccant	600 lbs. (250 lbs. SGe)
Dryland	0 lbs. (0 lbs. SGe)
3/ Potatoes, WEGs 3, 4, 5, 6, 7, & 8	
Irrigated, without desiccants	1,500 lbs. (850 lbs. SGe)
Irrigated, with desiccant	800 lbs. (375 lbs. SGe)
Dryland, without desiccant	1,000 lbs. (500 lbs. SGe)
Dryland, with desiccant	545 lbs. (240 lbs. SGe)

1/ Field experience in the Northern Great Plains indicates the ratio of residue to grain is higher when crops are grown in narrow row seedings. Research data is not available at this time to confirm this common observation. Until research is available, these residue production values may be increased 30 percent when these crops are planted in rows less than 20 inches apart.

2/ Soybeans are considered "narrow row" when planted in rows not over 14 inches apart. The most common spacing is 7 to 8 inches. Field experience in the Northern Great Plains indicates the ratio of residue to grain is higher when soybeans are grown in narrow row seedings, as compared to wide row seedings. Research data is not available, at this time, to confirm this common observation. Until research is available, a ratio of 65 pounds residue per bushel of grain may be used for narrow row soybeans.

3/ Potato residue varies significantly with potato varieties, time of harvest, fertility program, and leaf diseases. If the figures in this table are not accepted, the alternative of collecting surface residue and weighing is available. Refer to the Range Handbook for residue collecting or contact your area agronomist. A minimum of five collections will be required. Weights will be on an air dry basis.

In calculating soil losses, we are using productivity indexes. If you need to convert spring wheat yields to yields of other crops, use the following:

Factors to convert spring wheat yields:

Oats	--	Wheat Yield x 2.125 (bushels)
Barley	--	Wheat Yield x 1.625 (bushels)
Corn	--	Wheat Yield x 2.2 (bushels)
Flax	--	Wheat Yield x 0.5 (bushels)
Sunflowers	--	Wheat Yield x 50 (hundred weight)
Soybeans	--	Wheat Yield x 0.73 (bushels)
Sugar Beets	--	Wheat Yield x 0.3625 (tons)
Rye	--	Wheat Yield x 1.275 (bushels)

The following information on residue reduction was developed from available research data, SCS Field Office Technical Guides and from farm equipment manufacturers. Each tillage or planting operation reduces the residue that was present prior to the operation.

Crop residues have been generally classified as being either Nonfragile or Fragile as defined in Table 5, Residue Types. This is a subjective classification based on the ease in which crop residues are decomposed by the elements or buried by tillage operations. Plant characteristics such as composition and size of leaves and stems; density of the residue, and relative quantities produced were considered.

Many factors affect the amount of residue remaining after a pass with a tractor and tillage or planting implement. Residue amounts are sensitive to depth and speed of equipment operation and row spacing. When selecting values from the ranges in Table 6, Residue Reduction, for a specific implement, consider the following general rule of thumb.

(1) At shallower operating depths, greater amounts of residue remain on the soil surface, while at deeper operating depths, more residue is buried.

(2) Slower operating speeds tend to leave more residues on the soil surface while at faster speeds, more residue is buried. Under some conditions field cultivators, finishing tools with field cultivator gangs, some planters and drills may return as much as 20 percent of the residue incorporated at shallow depths by recent operations.

(3) Excess wheel slippage, caused by improper ballasting of tractor tires, can destroy valuable residues in the wheel tracks.

Use the residue reduction figures in Table 6, Residue Reduction, as a guide in selecting the types of equipment and blades, points or sweeps used in the tillage system.

TABLE 5

RESIDUE TYPES

NONFRAGILE		FRAGILE	
Alfalfa or legume hay	Triticale *	Canola/Rapeseed	Vegetables
Barley *	Wheat *	Dry Beans	
Buckwheat	Sorghum	Dry Peas	
Corn	Speltz *	Fall seeded cover crops	
Flax Seed		Green Peas	
Forage Seed		Lentils	
Forage Silage		Mustard	
Grass Hay		Potatoes	
Millet		Safflower	
Oats *		Soybeans	
Pasture		Sugar Beets	
Popcorn		Sunflowers	
Rye *		Sweet Potatoes	

TABLE 6

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
PLOWS:		
Moldboard plow	0 - 10	0 - 5
Disk plow	10 - 20	5 - 15
MACHINES WHICH FRACTURE SOIL:		
Paratill/Paraplow	80 - 90	75 - 85
"V" ripper/subsoiler, 12 - 14" deep at 20" spacing	70 - 90	60 - 80
Combination Tools		
Subsoil-chisel	50 - 70	40 - 50
Disk-subsoiler	30 - 50	10 - 20
CHISEL PLOWS with:		
Sweeps	70 - 85	50 - 60
Straight chisel spike points	60 - 80	40 - 60
Twisted points or shovels	50 - 70	30 - 40
COMBINATION CHISEL PLOWS:		
Coulter Chisel plows with:		
Sweeps	60 - 80	40 - 50
Straight chisel spike points	50 - 70	30 - 40
Twisted points or shovels	40 - 60	20 - 30
Disk Chisel plows with:		
Sweeps	60 - 70	30 - 50
Straight chisel spike points	50 - 60	30 - 40
Twisted points or shovels	30 - 50	20 - 30
UNDERCUTTERS:		
Stubble-mulch sweep or blade plows with:		
Sweep/"V" Blade > 30" wide	85 - 95	70 - 80
Sweeps 20" - 30" wide	80 - 90	65 - 75
DISK HARROWS:		
Offset		
Heavy plowing > 10" spacing	25 - 50	10 - 25
Primary cutting > 9" spacing	30 - 60	20 - 40
Finishing 7"-9" spacing	40 - 70	25 - 40
Tandem		
Heavy plowing > 10" spacing	25 - 50	10 - 25
Primary cutting > 9" spacing	30 - 60	20 - 40
Finishing 7"-9" spacing	40 - 70	25 - 40

TABLE 6 (Cont.)

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
DISK HARROWS:		
Tandem		
Light tandem disk after harvest, before other tillage ...	70 - 80	40 - 50
One-way disk with:		
12"-16" blades	40 - 50	20 - 40
18"-30" blades	20 - 40	10 - 30
Single gang disk	50 - 70	40 - 60
FIELD CULTIVATORS (including leveling attachments):		
Used as the primary tillage operation		
Sweeps 12"-20"	60 - 80	55 -75
Sweeps or shovels 6"-12"	35 - 75	50 - 70
Duckfoot points	35 - 60	30 - 55
Field cultivators as secondary operation following chisel or disk		
Sweeps 12"-20"	80 - 90	60 - 75
Sweeps or shovels 6"-12"	70 - 80	50 - 60
Duckfoot points	60 - 70	35 - 50
FINISHING TOOLS:		
Combination finishing tools with:		
Disks, shanks, and leveling attachments	50 - 70	30 - 50
Spring teeth and rolling basket	70 - 90	50 - 70
Harrows:		
Springtooth (coil tine)	60 - 80	50 - 70
Spiketooth	70 - 90	60 - 80
Flex-tine tooth	75 - 90	70 - 80
Roller harrow (cultipacker)	60 - 80	50 - 70
Packer roller	90 - 95	90 - 95
Rotary Tiller		
Secondary operation 3" deep	40 - 60	20 - 40
Primary operation 6" deep	15 - 35	5 - 15
RODWEEDERS:		
Plain rotary rod	80 - 90	50 - 60
Rotary rod with semi chisels or shovels	70 - 80	60 - 70

TABLE 6 (Cont.)

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
STRIP TILLAGE MACHINES:		
Rotary tiller, 12" tilled on 40" rows	60 - 75	50 - 60
ROW CULTIVATORS (30" and wider):		
Single sweep per row	75 - 90	55 - 70
Multiple sweeps per row	75 - 85	55 - 65
Finger wheel cultivator	65 - 75	50 - 60
Rolling disk cultivator	45 - 55	40 - 50
Ridge till cultivator	20 - 40	5 - 25
UNCLASSIFIED MACHINES:		
Anhydrous applicator	75 - 85	45 - 70
Anhydrous applicator with closing disks	60 - 75	30 - 50
Subsurface manure applicator	60 - 80	40 - 60
Rotary hoe	85 - 90	80 - 90
Bedders, listers, and hippers	15 - 30	5 - 20
Furrow diker	85 - 95	75 - 85
Mulch treader	70 - 85	60 - 75
DRILLS:		
Hoe opener drills	50 - 80	40 - 60
Semi-deep furrow drill or press drill (7"-12" spacing)	70 - 90	50 - 80
Deep furrow drill with > 12" spacing	60 - 80	50 - 80
Single disk opener drills	85 - 100	75 - 85
Double disk opener drills (conventional)	80 - 100	60 - 80
No-till drills and drills with the following attachments in standing stubble:		
Smooth no-till coulters	85 - 95	70 - 85
Ripple or bubble coulters	80 - 85	65 - 85
Fluted coulters	75 - 80	60 - 80
No-till drills and drills with the following attachments in flat residues:		
Smooth no-till coulters	65 - 85	50 - 70
Ripple or bubble coulters	60 - 75	45 - 65
Fluted coulters	55 - 70	40 - 60

TABLE 6 (Cont.)

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
DRILLS (Cont.):		
Air seeders: (Refer to appropriate field cultivator or chisel plow depending on the type of ground engaging device used.)		
ROW PLANTERS:		
Conventional planters with:		
Runner openers	85 - 95	80 - 90
Staggered double disk openers	90 - 95	85 - 95
Double disk openers	85 - 95	75 - 85
No-till Planters:		
Smooth coulters	85 - 95	75 - 90
Ripple coulters	75 - 90	70 - 85
Fluted coulters	65 - 85	55 - 80
Strip till planters with:		
2 or 3 fluted coulters	60 - 80	50 - 75
Row cleaning devices (8-14" wide bare strip using brushes, spikes furrowing disks, or sweeps)	60 - 80	50 - 60
Ridge till planter	40 - 60	20 - 40
CLIMATIC EFFECTS:		
Over winter weathering 2/ **		
Following summer harvest	70 - 90	65 - 85
Following fall harvest	80 - 95	70 - 80
Over summer weathering	70 - 90	65 - 85

** In northern climates with long periods of snow cover and frozen conditions, weathering may reduce residue levels only slightly, while in warmer climates, weathering losses reduce residue levels significantly. The higher figure will be used in most cases.

1/ If small grain was harvested with a rotary combine, residue is considered fragile.

Converting to Small Grain Equivalent (SGe)

Small Grain Equivalent (SGe) - The wind erosion control equivalent of vegetative cover, compared to a standard condition used for comparative testing in a wind tunnel. The small grain equivalent value of field residues is a function of kind, amount, and orientation of growing plants or plant residues on the soil surface.

Note: Flat small grain in field condition (randomly distributed) must be converted to small grain equivalent.

After the residue reduction actions (Table 6) have been considered and the amount and orientation of air dry remaining crop residue has been determined for the critical wind erosion period, convert to the small grain equivalent. Use the appropriate Chart 1, Pages C-8 to C-38 to make this conversion.

Photo Method for Determining Small Grain Equivalent (SGe)

The residue photos in "Still Farming With Residue" or similar photos show several crops with various percent ground cover.

Estimating Small Grain Equivalents (SGe) of Mixed Vegetative Cover Consisting of Two or More Components.

Procedure:

1. Describe each major type of vegetative cover and estimate the percentage of total air-dry weight made up of each component.

2. Using the appropriate SGe Chart 1 with the correct curve for each cover type, and using the total air-dry weight of all the vegetative cover on each chart, determine the SGe value of each component type.

3. Multiply the SGe value of each component (from step 2) by that component's percentage of total air-dry weight (from step 1).

4. Add the products (from step 3). The sum of the products is the weighted SGe for the mixed cover.

TABLE 10

PERCENT COVER

POUNDS RESIDUE	SMALL GRAIN	CORN, GRAIN SORGHUM, SOYBEANS, SUNFLOWERS BEFORE TILLAGE	SUNFLOWERS AFTER TILLAGE
200	10%		
400	20%	10%	
600	30%	15%	
800	40%	20%	
1,000	50%	25%	10%
1,500	65%	35%	15%
2,000	75%	40%	20%
2,500	80%	50%	25%
3,000	85%	55%	33%
4,000	85%	70%	40%

INDEX FOR SGe CHARTS (CHART 1)

CROPS	PAGE NUMBER
Alfalfa	28
Buckwheat	27
Corn (Grain)	21
Corn (Silage)	22
Corn and Sorghum (Growing)	23, 24
Dry Beans	29
Flax	33
Lentils	29
Millet	25
Mustard	34
Potatoes	35
Rape	36
Safflower	37
Small Grain	19
Small Grain (Growing)	20
Sorghum	26
Sorghum (Silage)	22
Soybean	29
Soybean (Growing)	31
Soybeans (Growing - Days After Emergence)	30
Sudan Grass	32
Sugar Beets	35
Sunflowers	38
Winter Pea	29
Manure	39
Grasses - Overgrazed	
Big Bluestem	41
Blue Grama	42
Buffalograss	41
Little Bluestem	42
Range Mixture	40
Switchgrass	42
Western Wheatgrass	41
Grasses - Properly Grazed	
Big Bluestem	44
Blue Grama	45
Buffalograss	44
Little Bluestem	45
Range Mixture	43
Switchgrass	45
Western Wheatgrass	44
Grasses - Ungrazed	
Blue Grama	47
Buffalograss	47
Range Mixture	46

~~HOERL ~ Y=A*B^X*X^C~~

Y=A+B*X

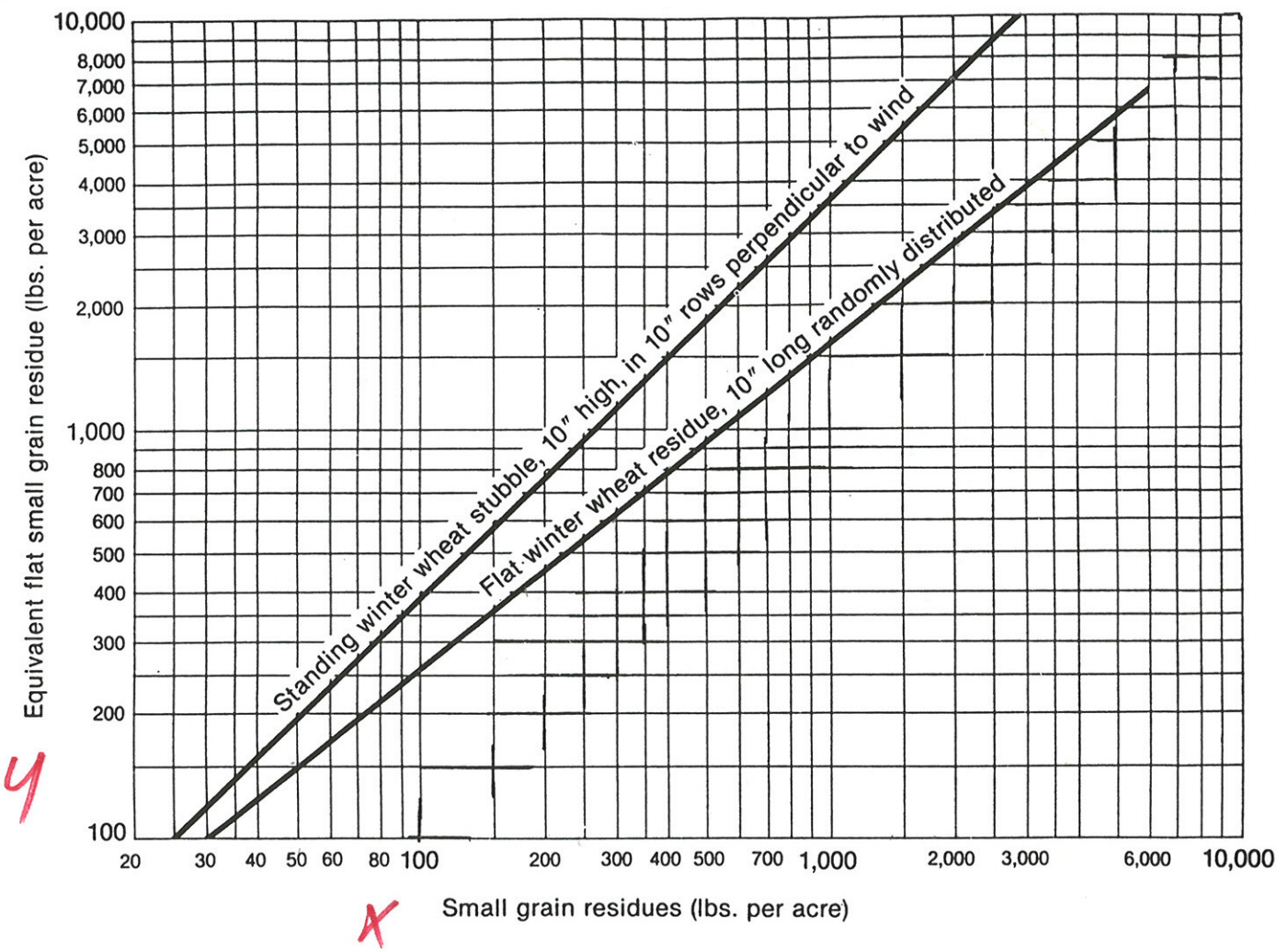
Y=(-42.37)+3.78X standing

CHART 1

1985

Flat Small Grain Equivalents of Small Grain Residues

(Use for wheat, barley, rye and oats)

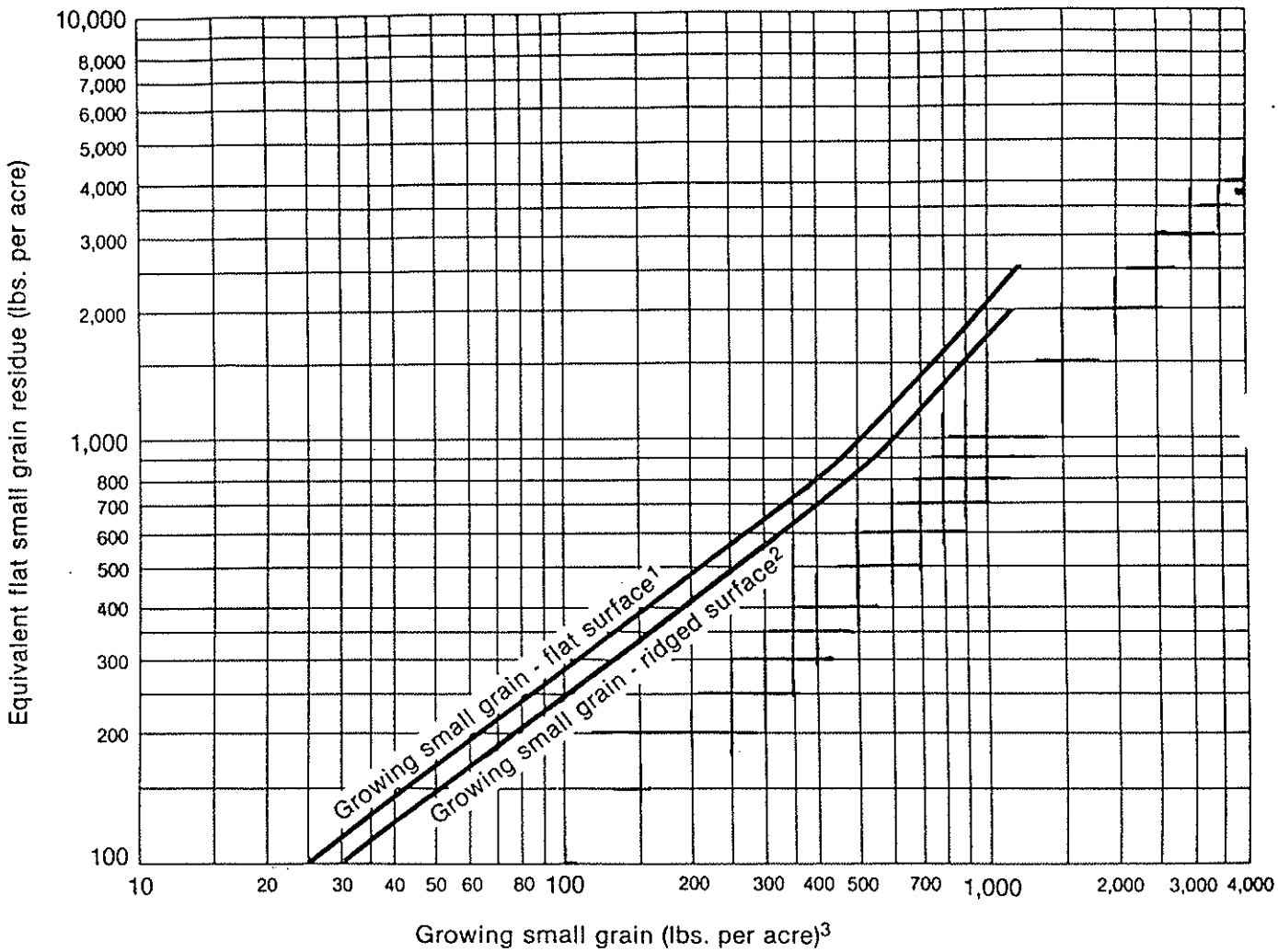


Source: Lyles and Allison—Trans. ASAE 1981, 24 (2): 405-408.
Residues are washed, air dried, and placed as described for wind tunnel tests.

CHART 1

1985

Flat Small Grain Equivalents of Growing Small Grain

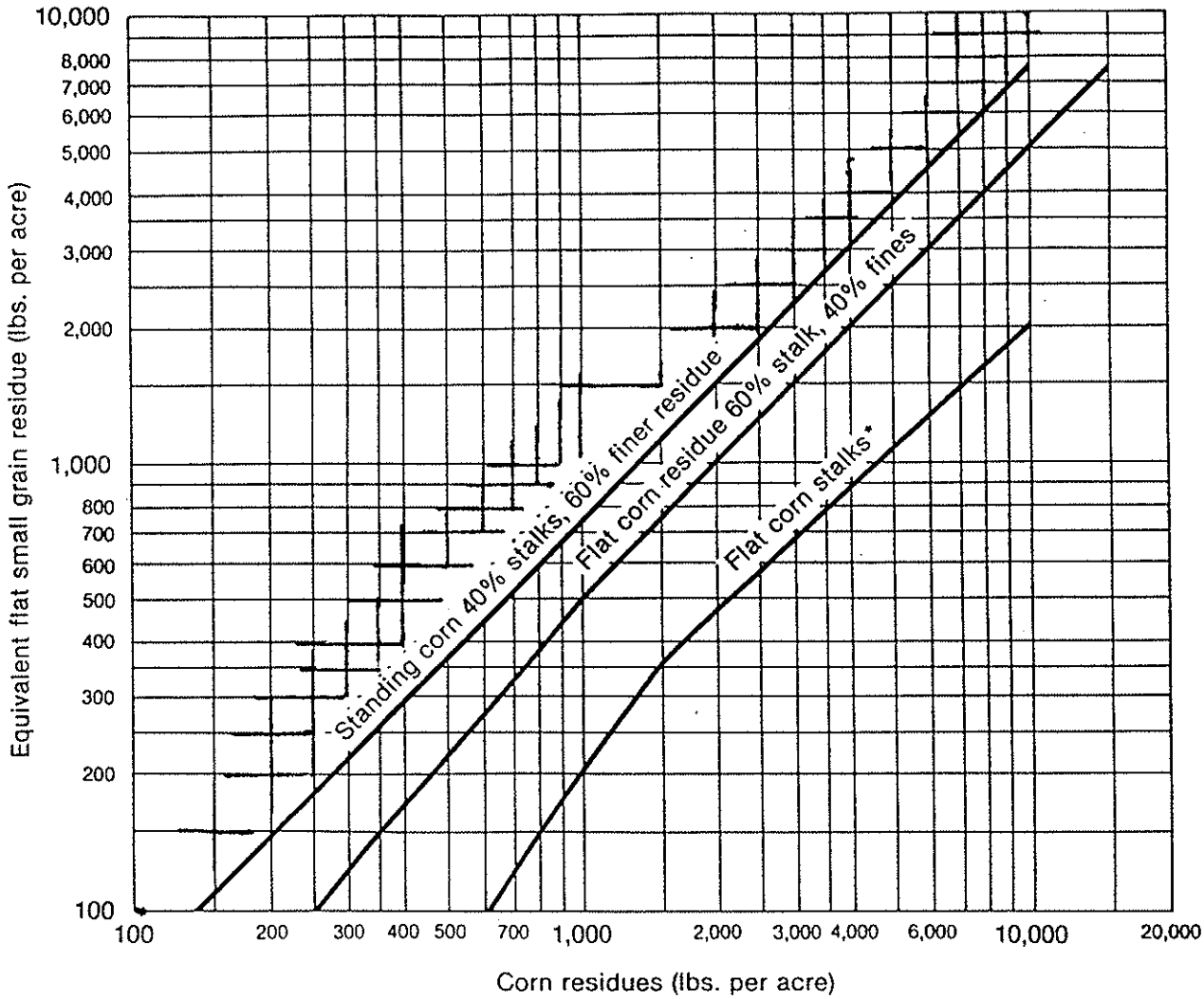


Sources
[1] Siddoway, F.H., W.S. Chepil, and D.V. Armbrust 1965
[2] Estimates by Best Judgement of SCS Personnel.
[3] Air-dry weights of growing winter wheat from emergence to winter dormancy.

CHART 1

1985

Flat Small Grain Equivalents of Corn Residues

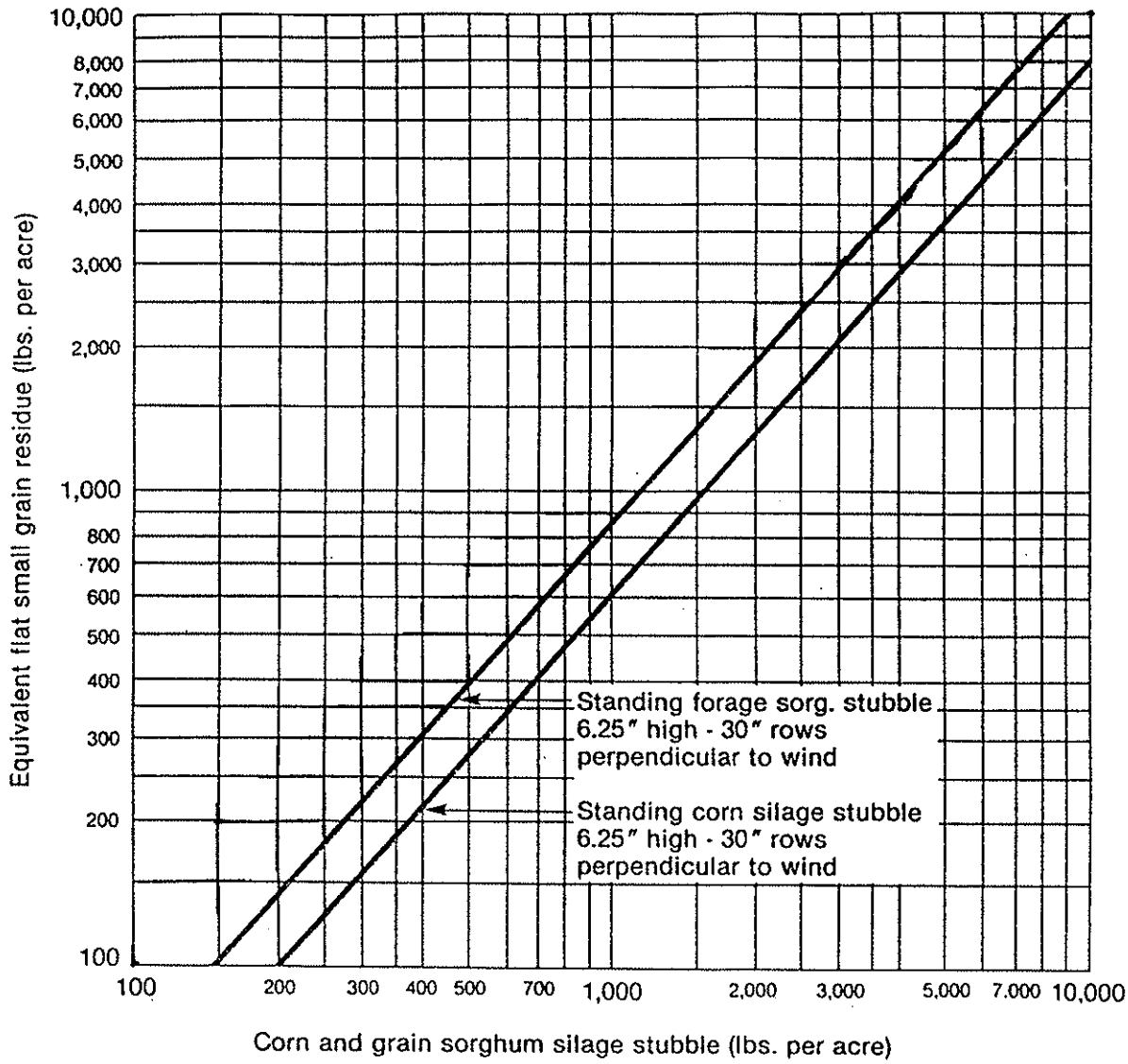


Source*: Lyles and Allison, Trans. ASAE 1981, 24(2): 405-408. (Flat to 2,000 lbs. standing to 3,500 lbs. Extended by SCS.)

CHART 1

1985

Flat Small Grain Equivalents of Corn and Grain Sorghum Silage Stubble

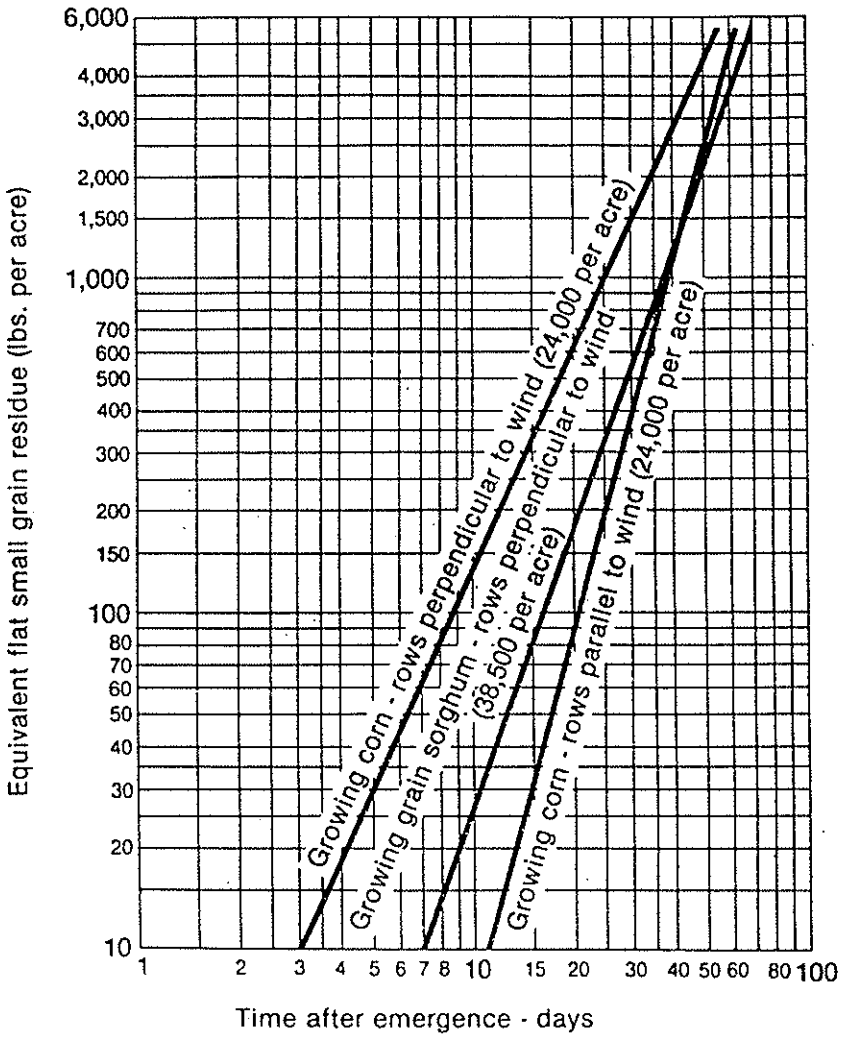


Source: Lyles and Allison, Trans, ASAE 1981, 24(2): 405-408.
Residue weights are washed, air dried, and placed as described for wind tunnel tests.

CHART 1

1985

Flat Small Grain Equivalents of Growing Corn and Grain Sorghum, Days After Emergence

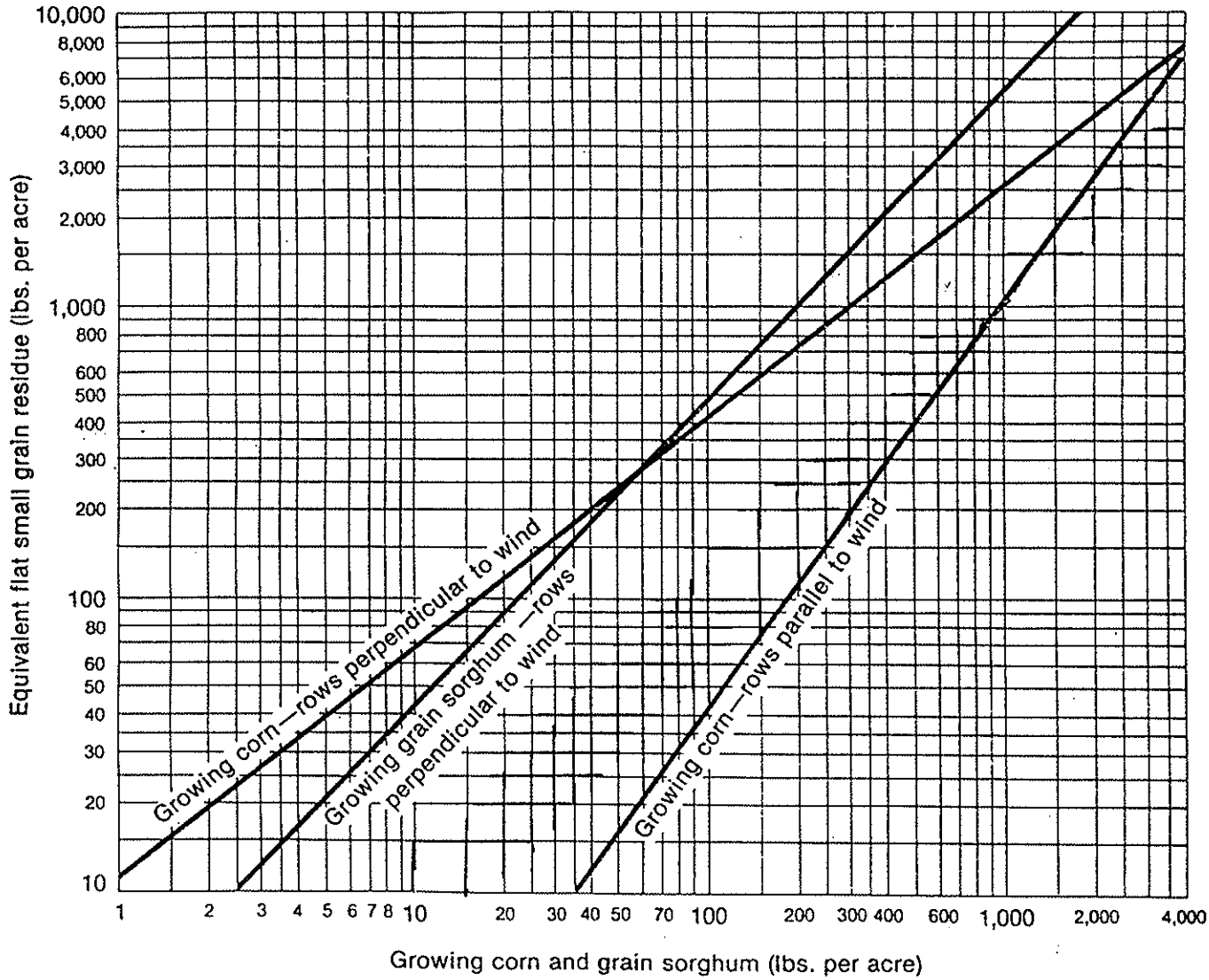


Source: Armbrust & Lyles, 1984-unpublished.

CHART 1

1985

Flat Small Grain Equivalents of Growing Corn and Grain Sorghum

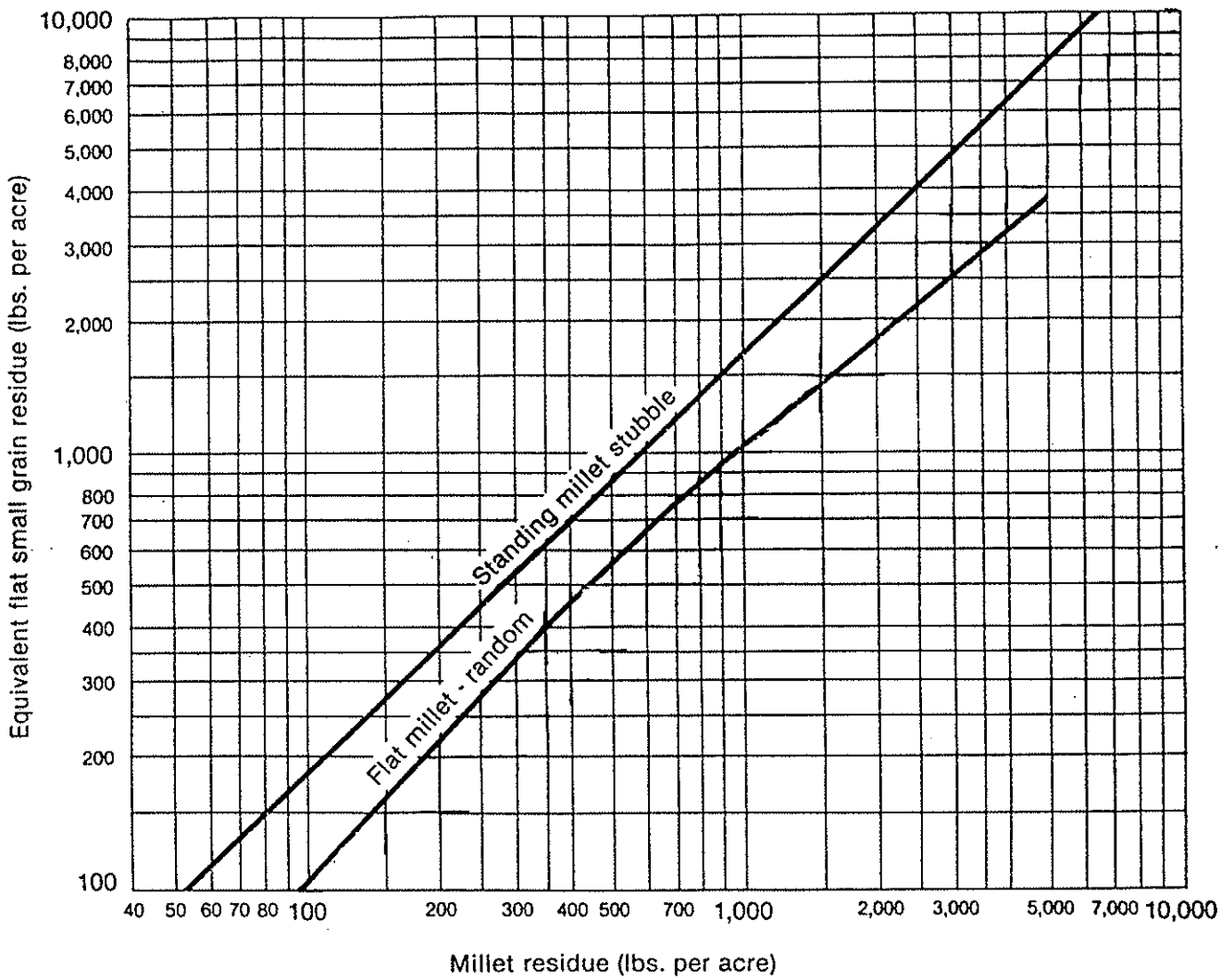


Source: Armbrust & Lyles, 1984 - unpublished

CHART 1

1985

Flat Small Grain Equivalents of Millet

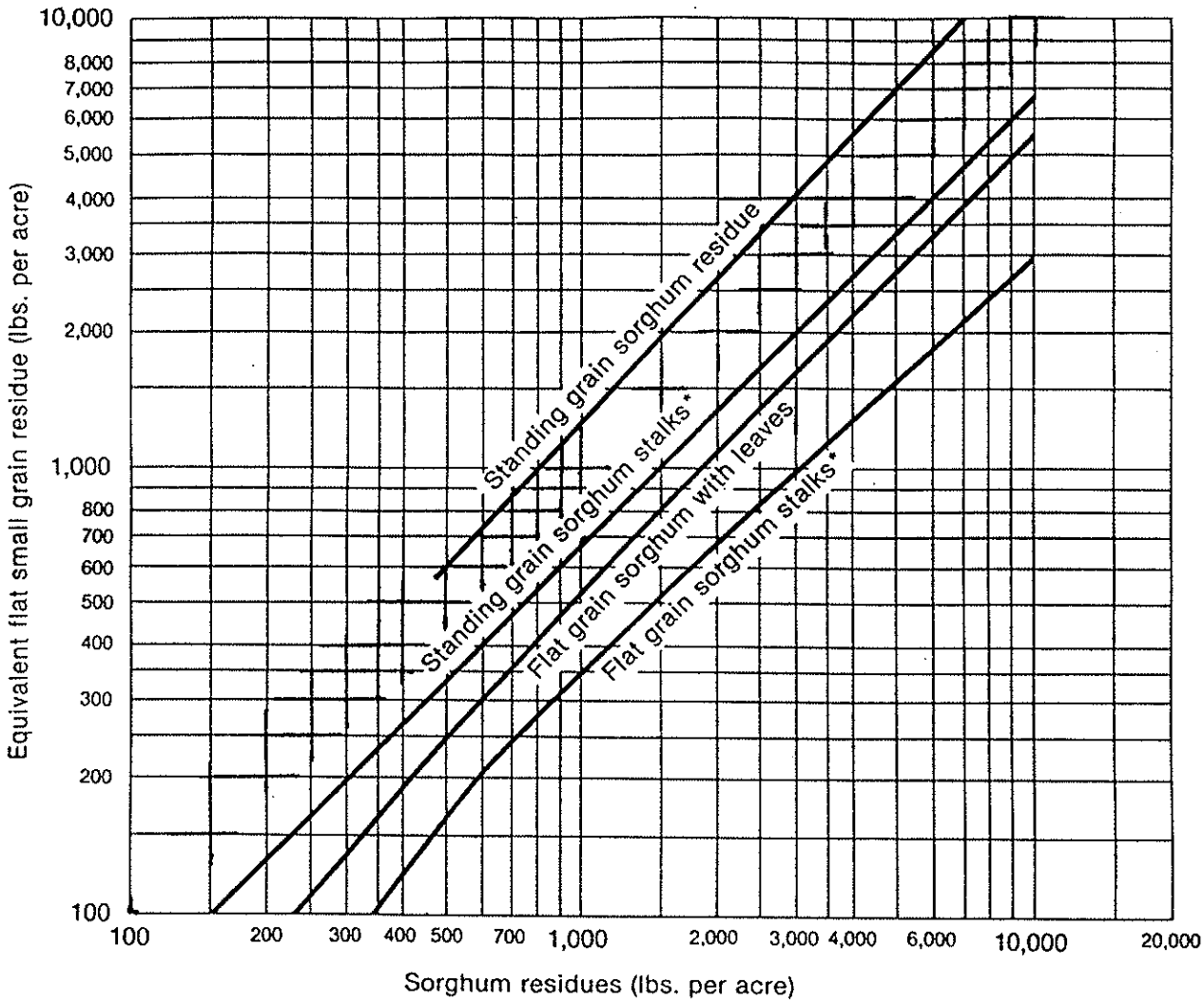


Source: Leon Lyles, ARS, memorandum, Jan. 25, 1985

CHART 1

1985

Flat Small Grain Equivalents of Sorghum Residues

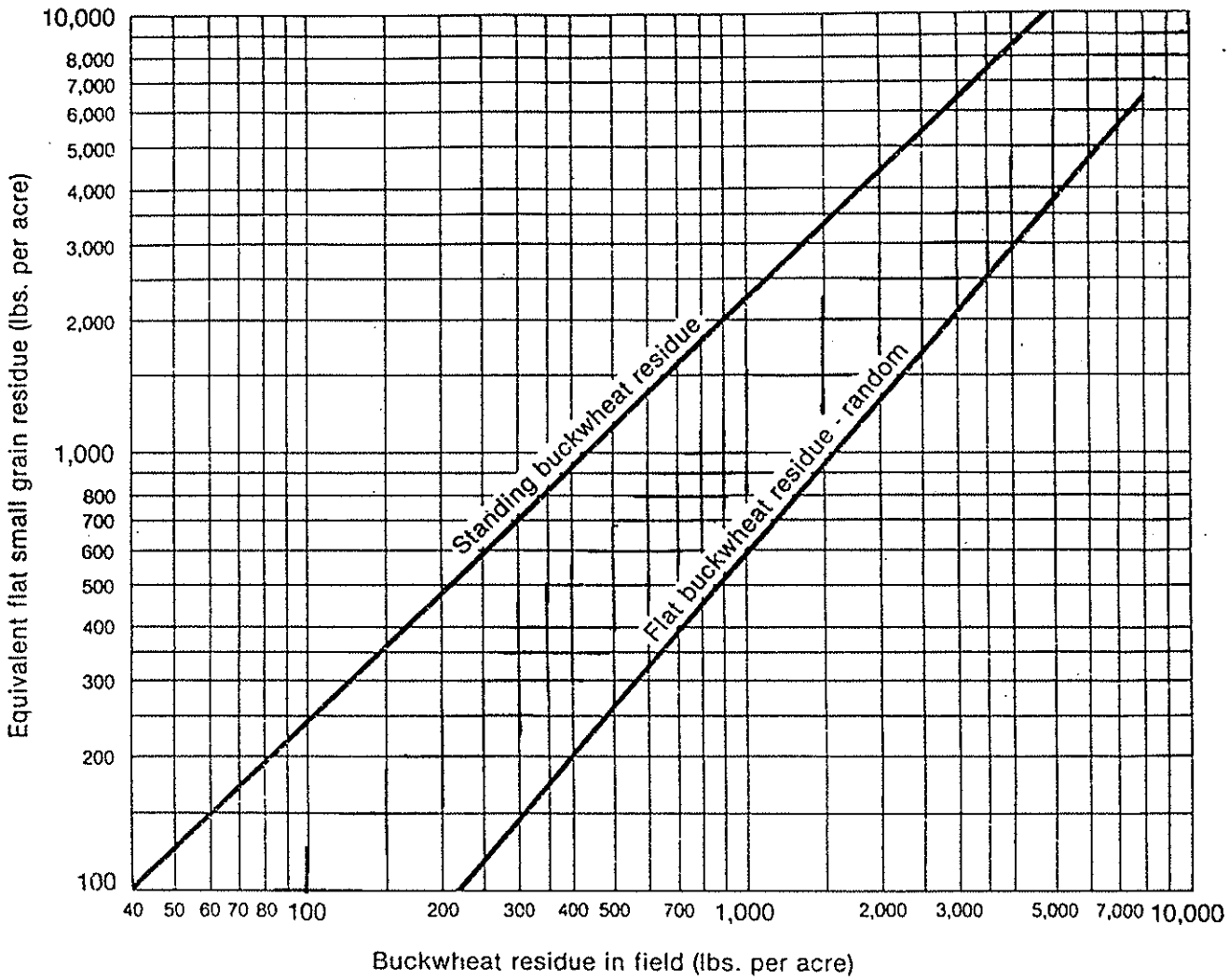


Source*: Lyles and Allison, Trans. ASAE 1981, 24(2): 405-408. (Flat to 2500 lbs. standing stalks to 3500 lbs.) Leafy residue estimates by SCS North Central agronomists, 11/84.

CHART 1

1985

Flat Small Grain Equivalents Buckwheat Residue

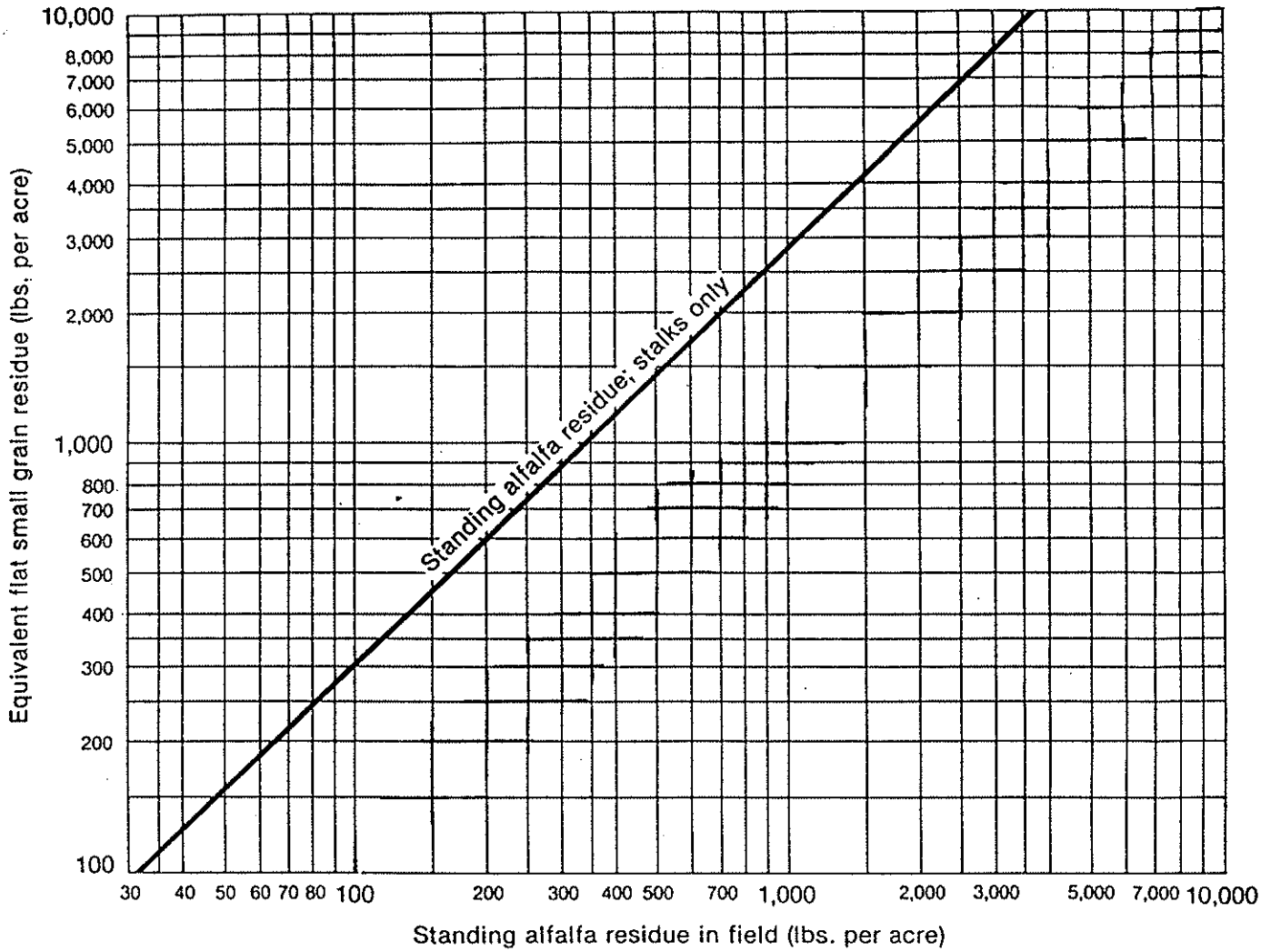


Source: Best Judgement Estimates by SCS. North Central Agronomists, 11/84.

CHART 1

1985

Flat Small Grain Equivalents of Alfalfa Residues

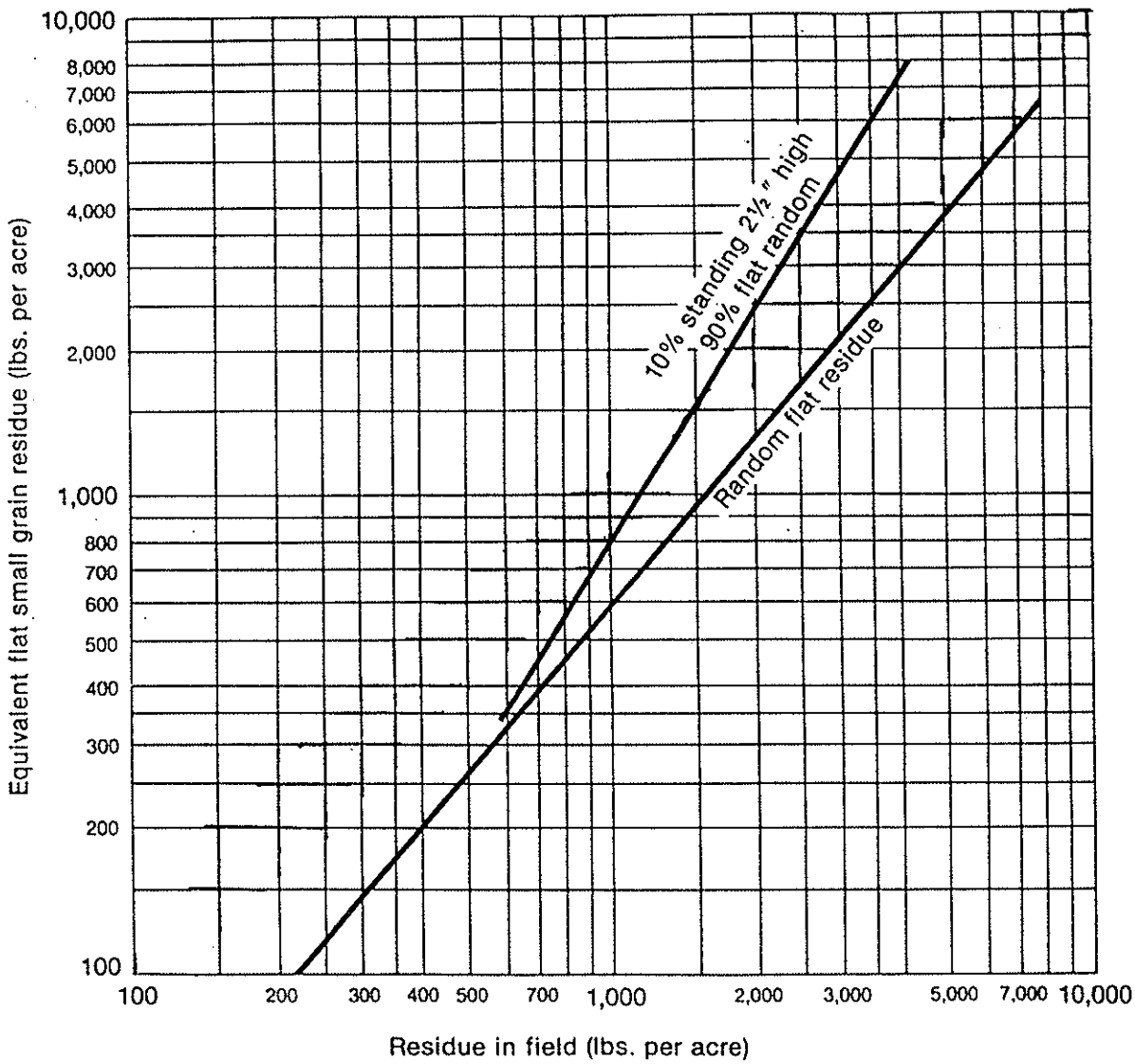


Source: Unpublished coefficients provided by Leon Lyles, ARS, Wind Erosion Research Unit, Manhattan, KS.

CHART 1

1985

Flat Small Grain Equivalents
Dry Bean, Lentil, *Soybean, & Winter Pea Residues

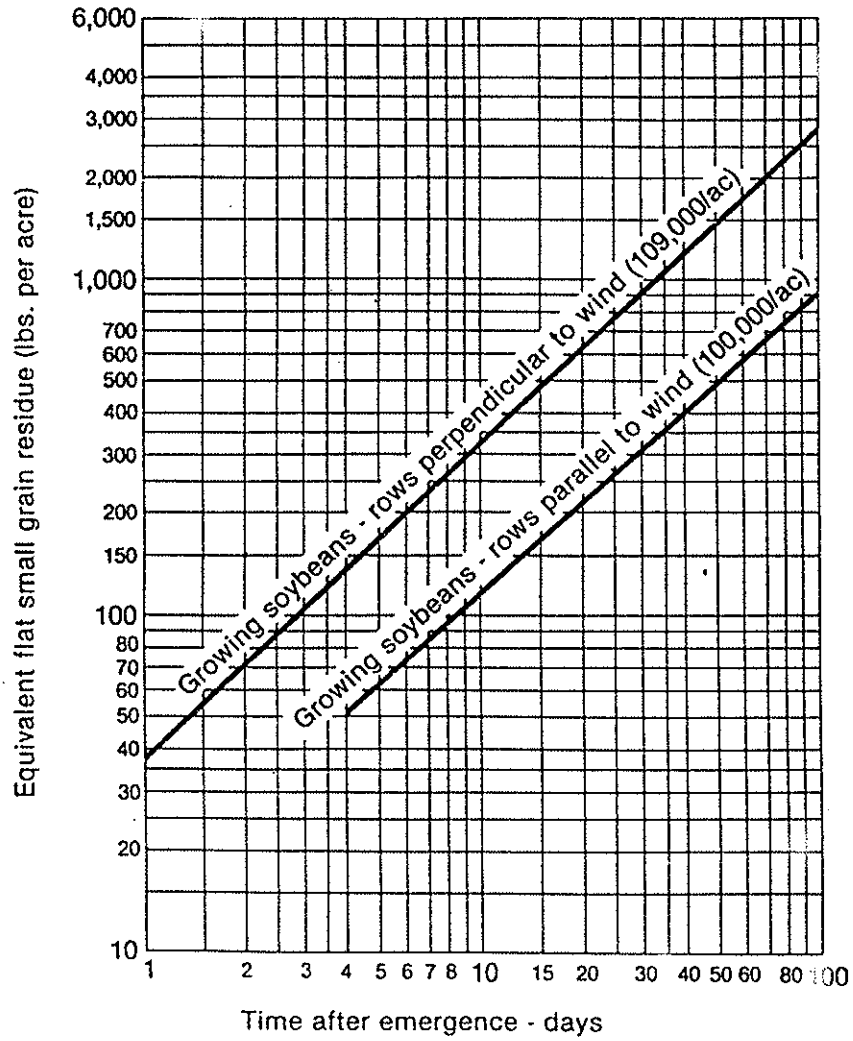


Source: Best Judgement Estimates by SCS. North Central Agronomists, 11/84.
*Soybeans - Lyles and Allison, Trans. ASAE 1981, 24(2): 405-408.

CHART 1

1985

Flat Small Grain Equivalents of Growing Soybeans - Days After Emergence

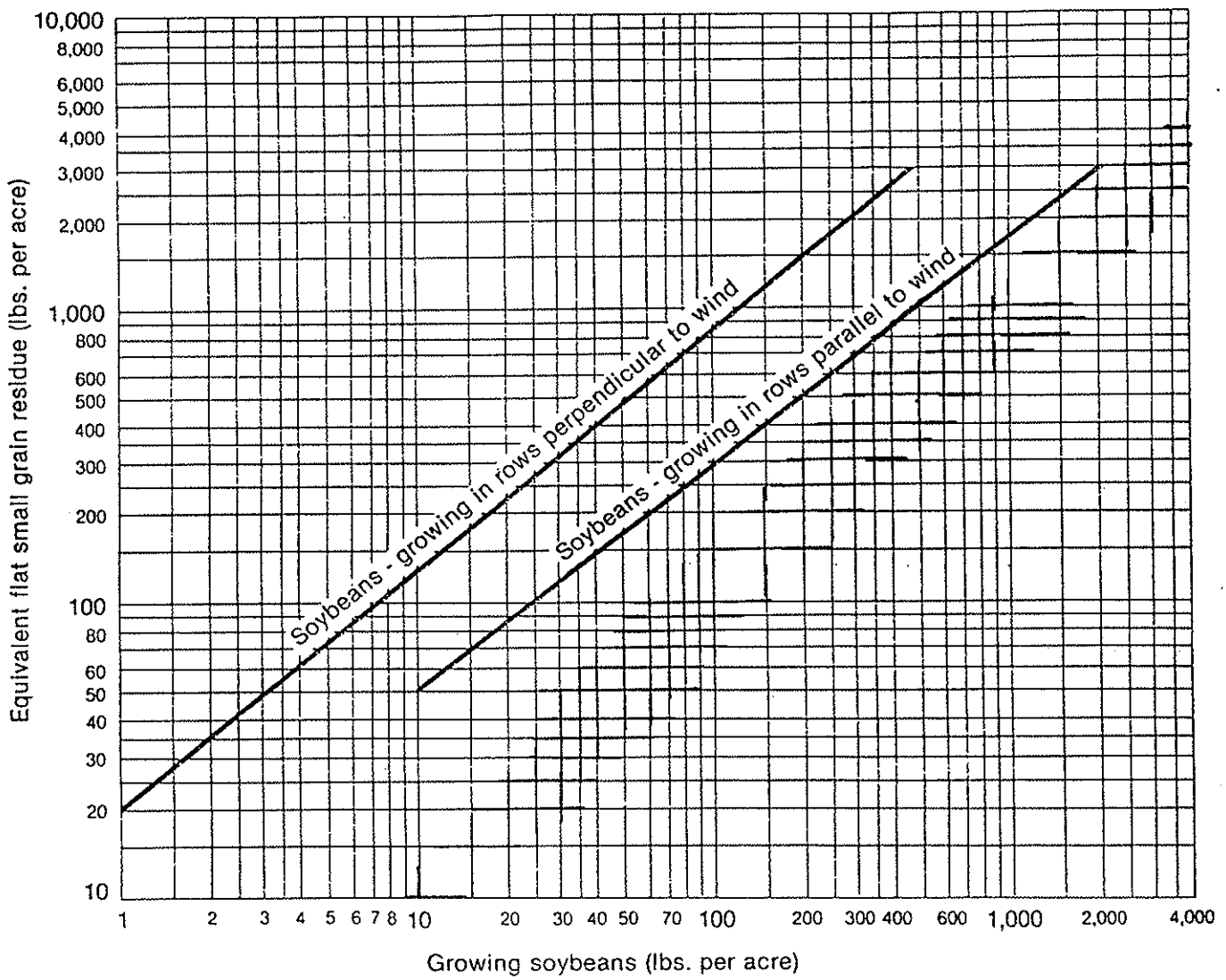


Source: Armbrust & Lyles, 1984-unpublished.

CHART 1

1985

Flat Small Grain Equivalents of Growing Soybeans

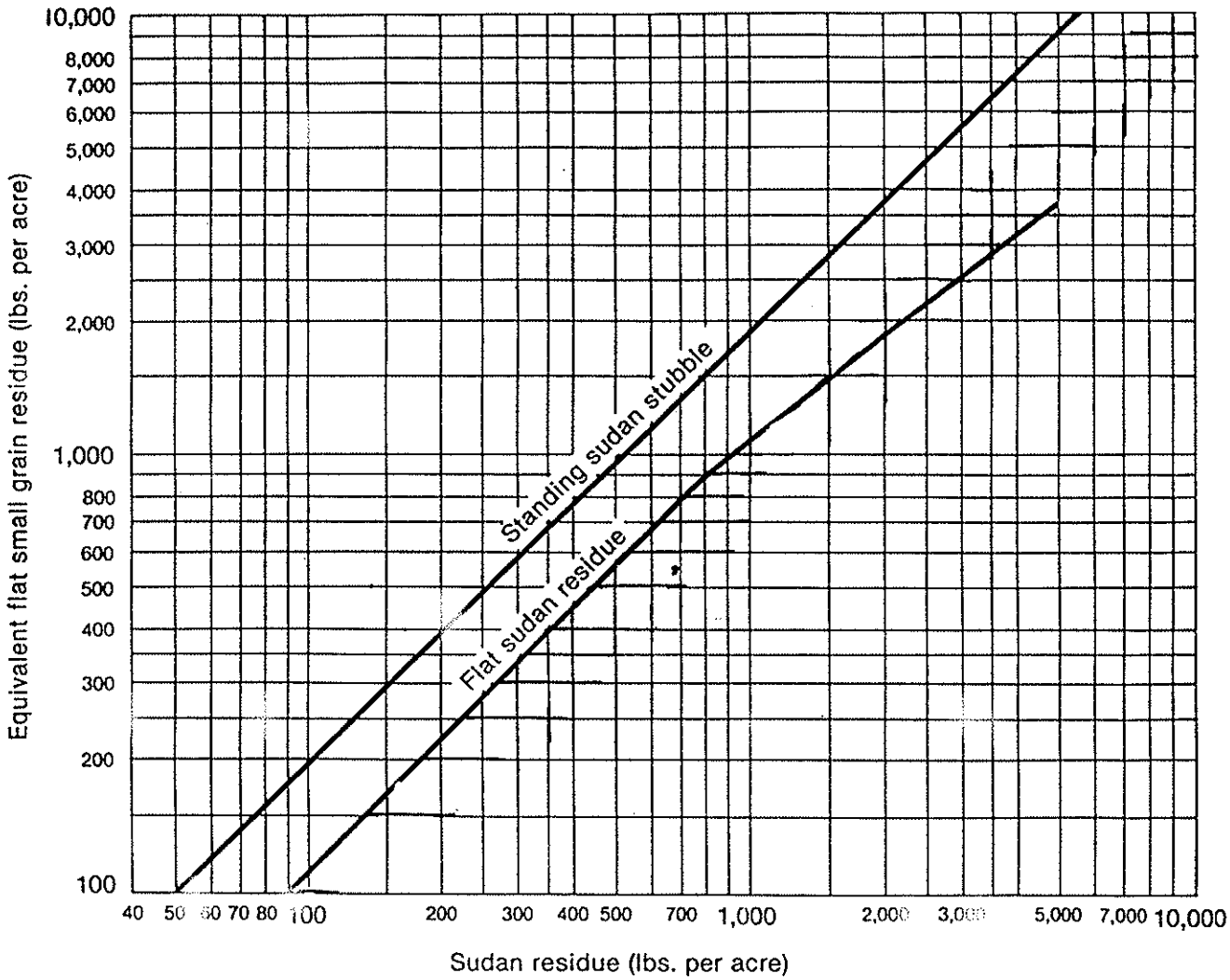


Source: Armbrust & Lyles, 1984-unpublished.

CHART 1

1985

Flat Small Grain Equivalents of Sudan Grass

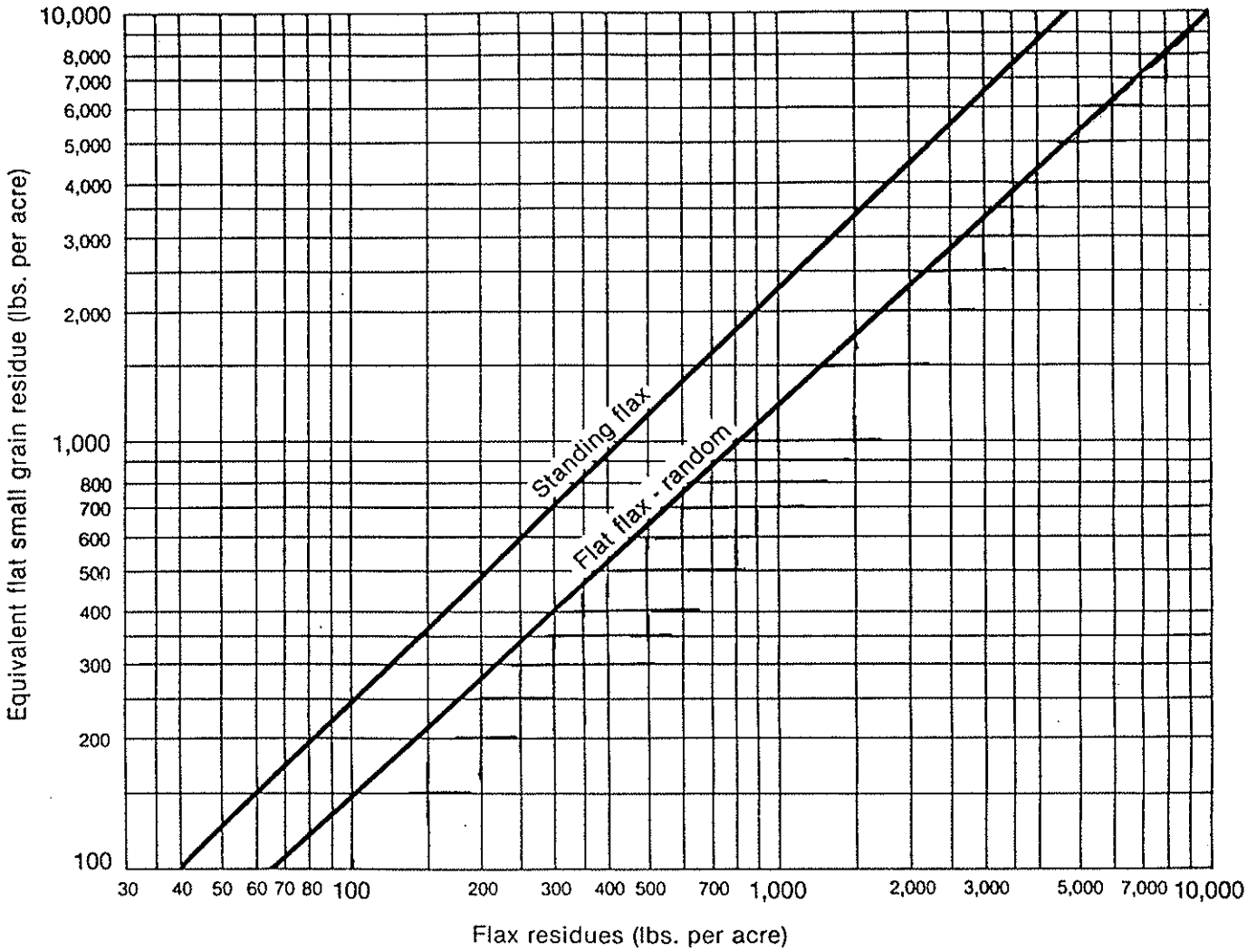


Source: Leon Lyles, ARS, memorandum, Jan. 25, 1985.

CHART 1

1985

Flat Small Grain Equivalents of Flax Residues

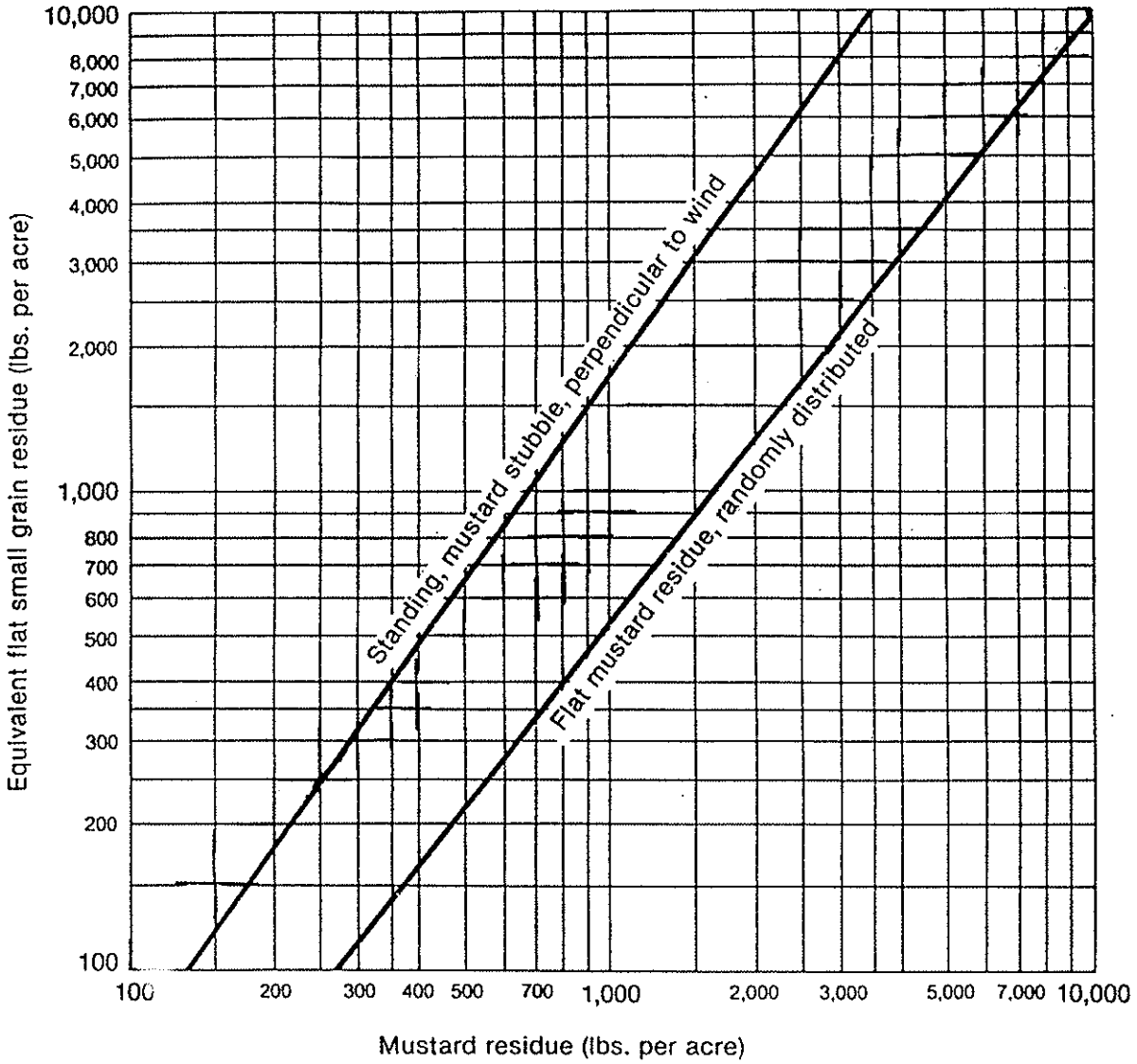


Source: Best Judgement Estimates by SCS. (North Central Agronomists, 11/84).

CHART 1

1985

Flat Small Grain Equivalent Mustard Residue

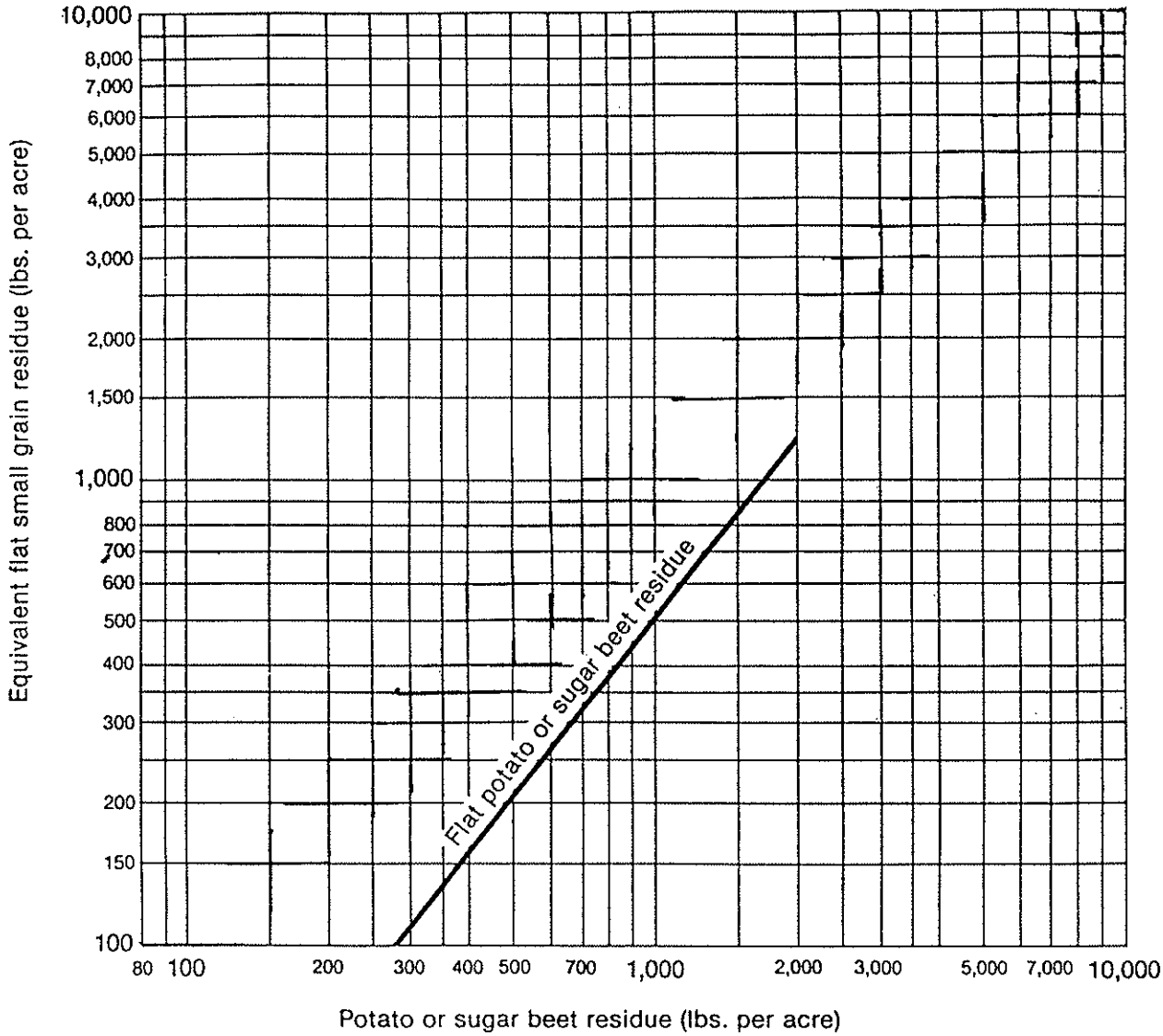


Source: Best Judgement Estimates by SCS. Western Agronomists, 1983.

CHART 1

1985

Flat Small Grain Equivalents of Potato and Sugar Beet Residue

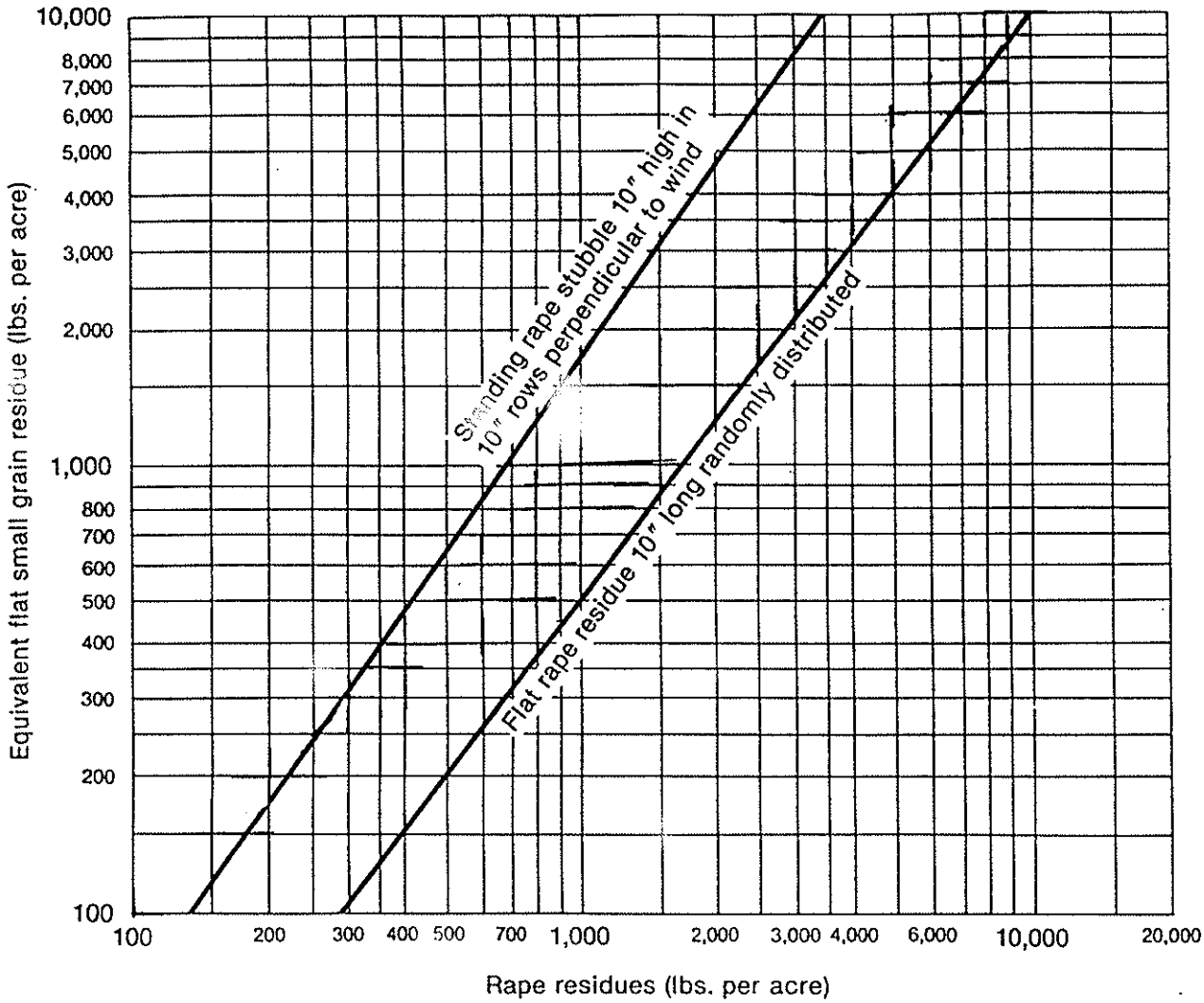


Source: Best Judgement Estimates by SCS, North Central Agronomists, 11/84.

CHART 1

1985

Flat Small Grain Equivalents of Rape Residues

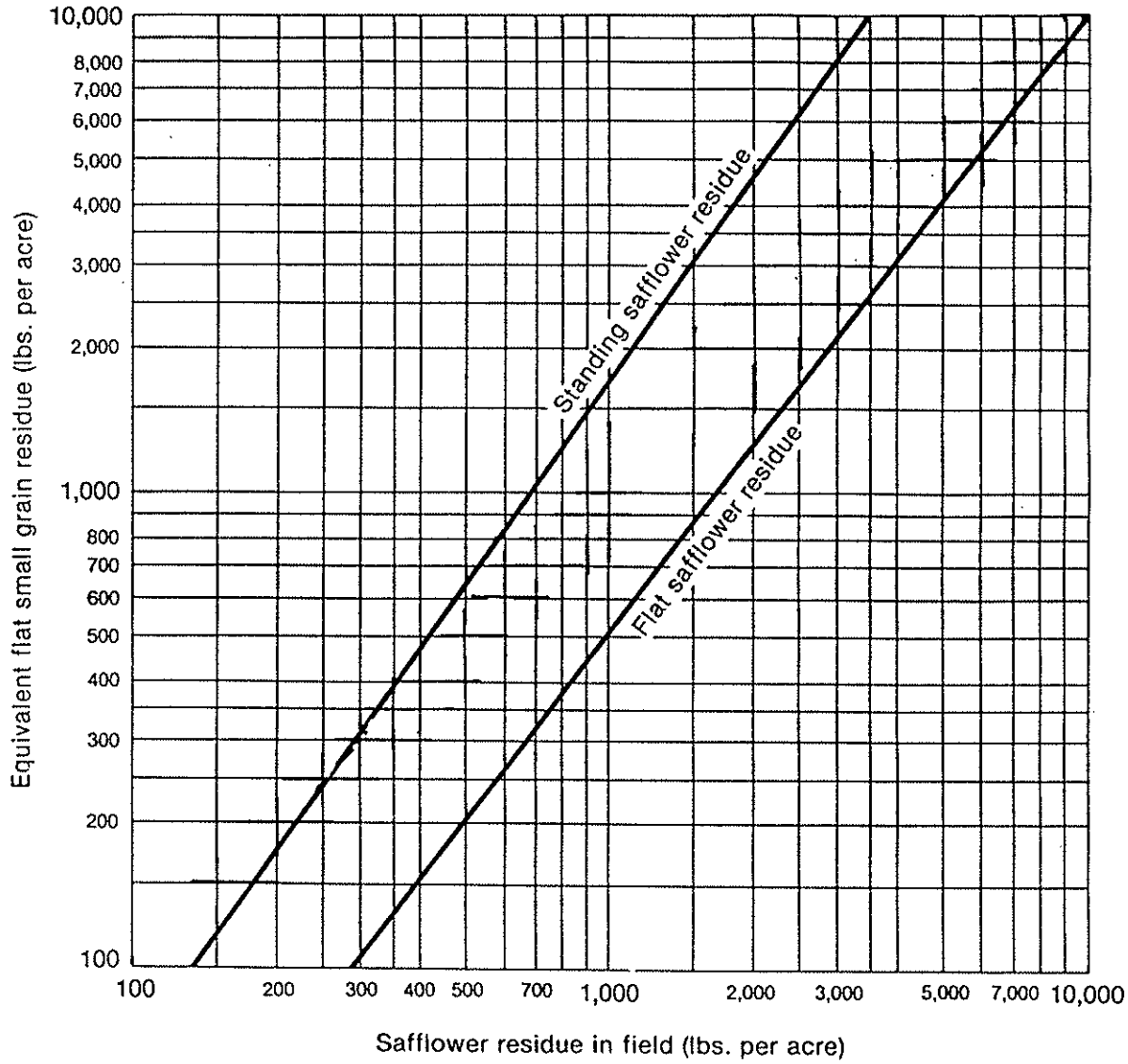


Source: Lyles and Allison, Trans. ASAE 1981, 24(2): 405-408.
Residue wts. are washed, air dried and placed as described.

CHART 1

1985

Flat Small Grain Equivalents Safflower Residue

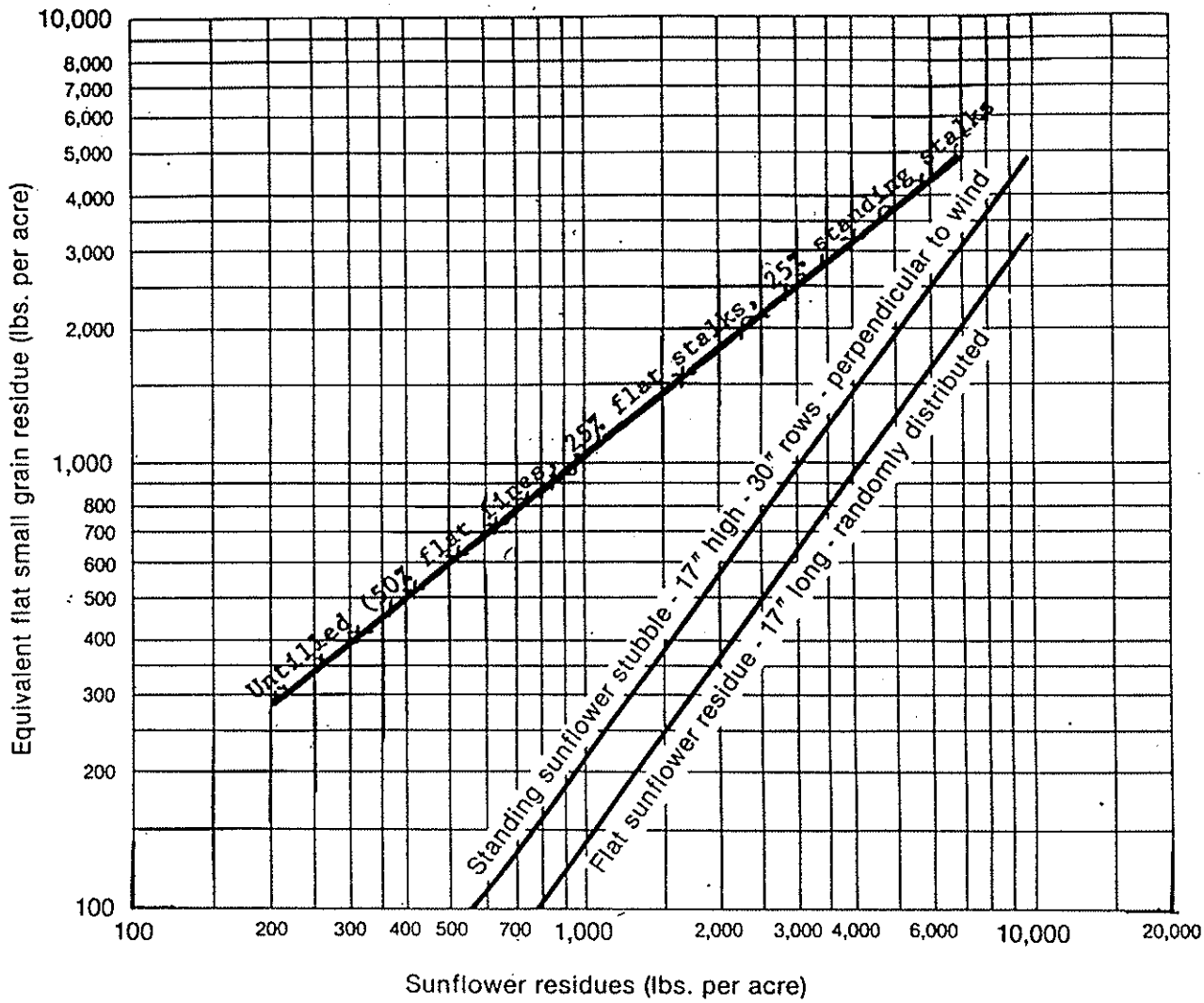


Source: Best Judgement Estimates by SCS, North Central Agronomists, 11/84.

CHART 1

1985

Flat Small Grain Equivalents of Sunflower Residues

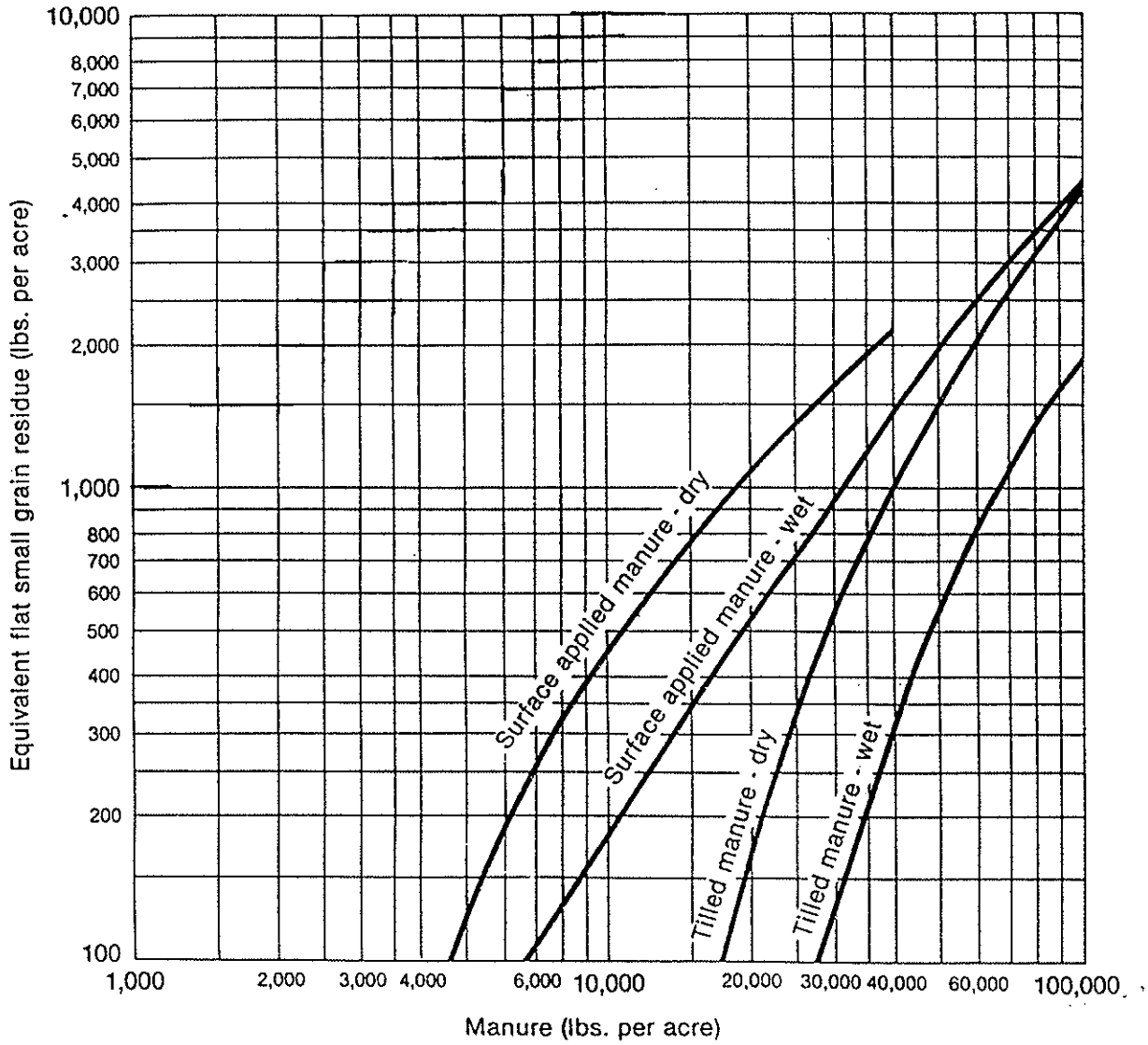


Source: Lyles and Allison, Trans. ASAE 1981, 24(2): 405-408.
Residue wts. are washed, air dried, and placed as described for wind tunnel test.

CHART 1

1985

Flat Small Grain Equivalent of Manure

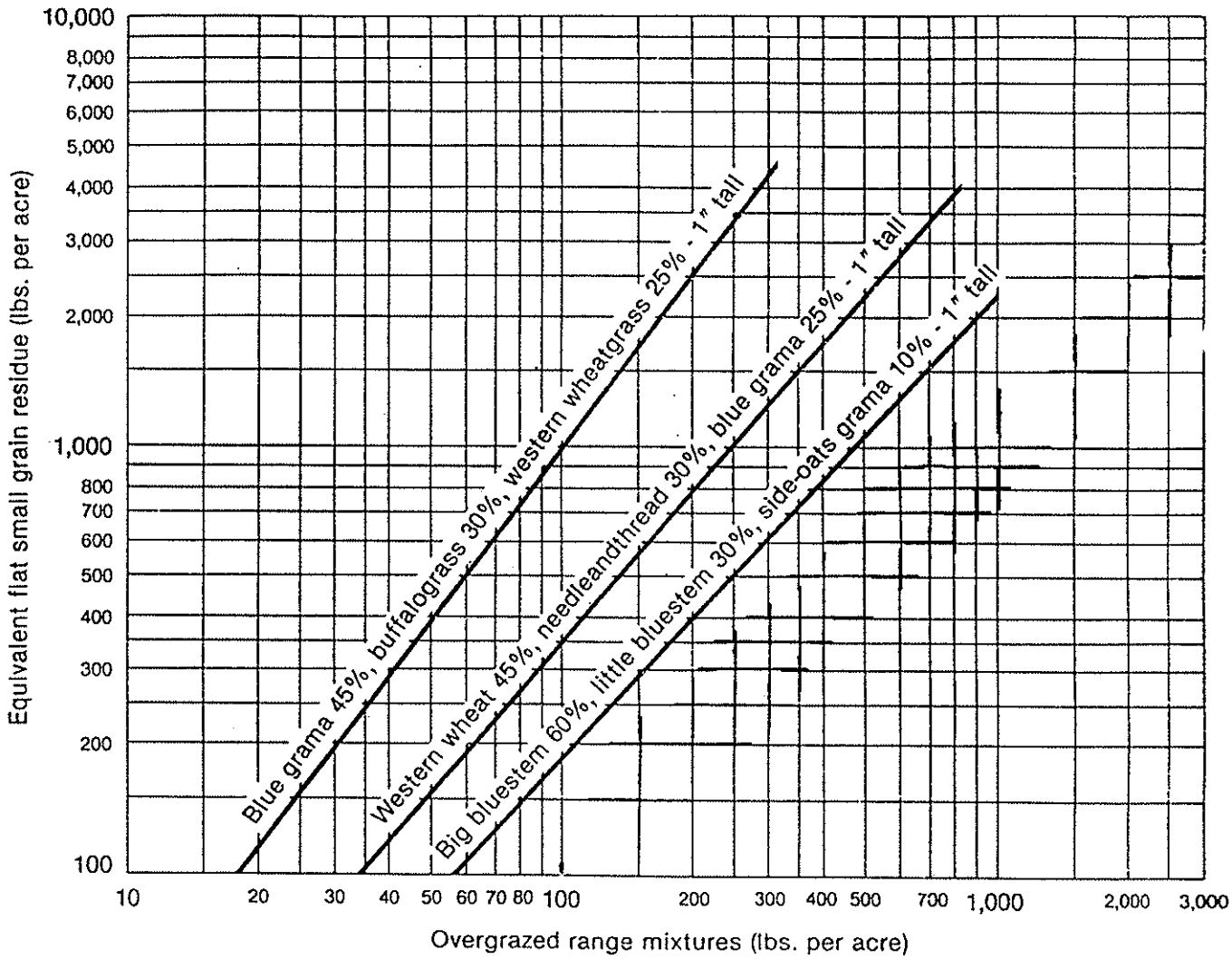


Source: Woodruff, N.P., L. Lyles, J.D. Dickerson, and D.V. Armbrust. 1974 Journal Soil and Water Conservation 29(3), pages 127-129.

CHART 1

1985

Flat Small Grain Equivalents of Overgrazed Range Mixtures·
Big Bluestem, Little Bluestem, Side-Oats Grama, Western Wheatgrass, Needleandthread, Blue Grama, and Buffalograss

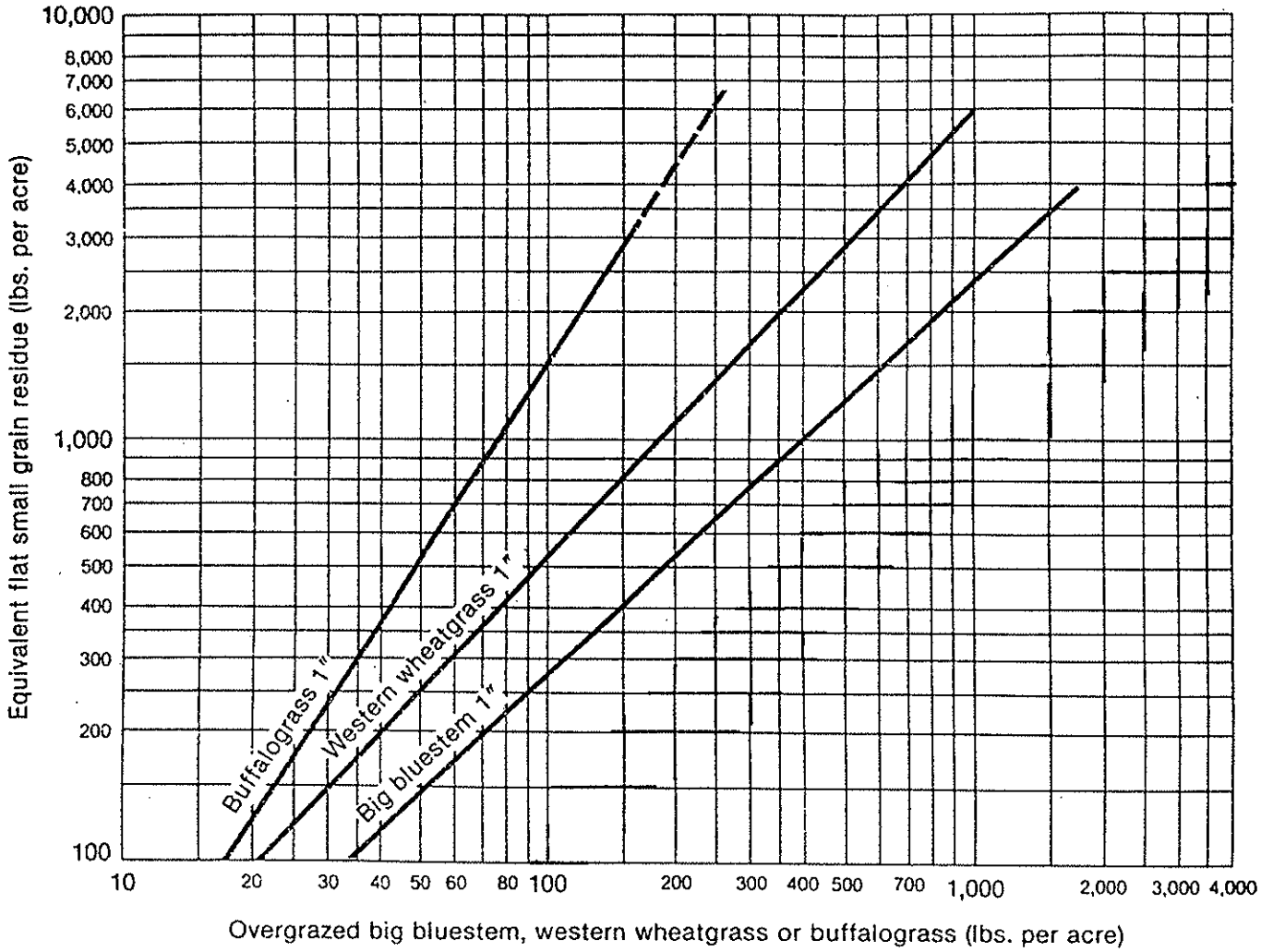


Source: Lyles and Allison - 1980 Journal Range Management, 33(2), pages 143 - 146.

CHART 1

1985

Flat Small Grain Equivalents of Overgrazed Big Bluestem, Western Wheatgrass, and Buffalograss

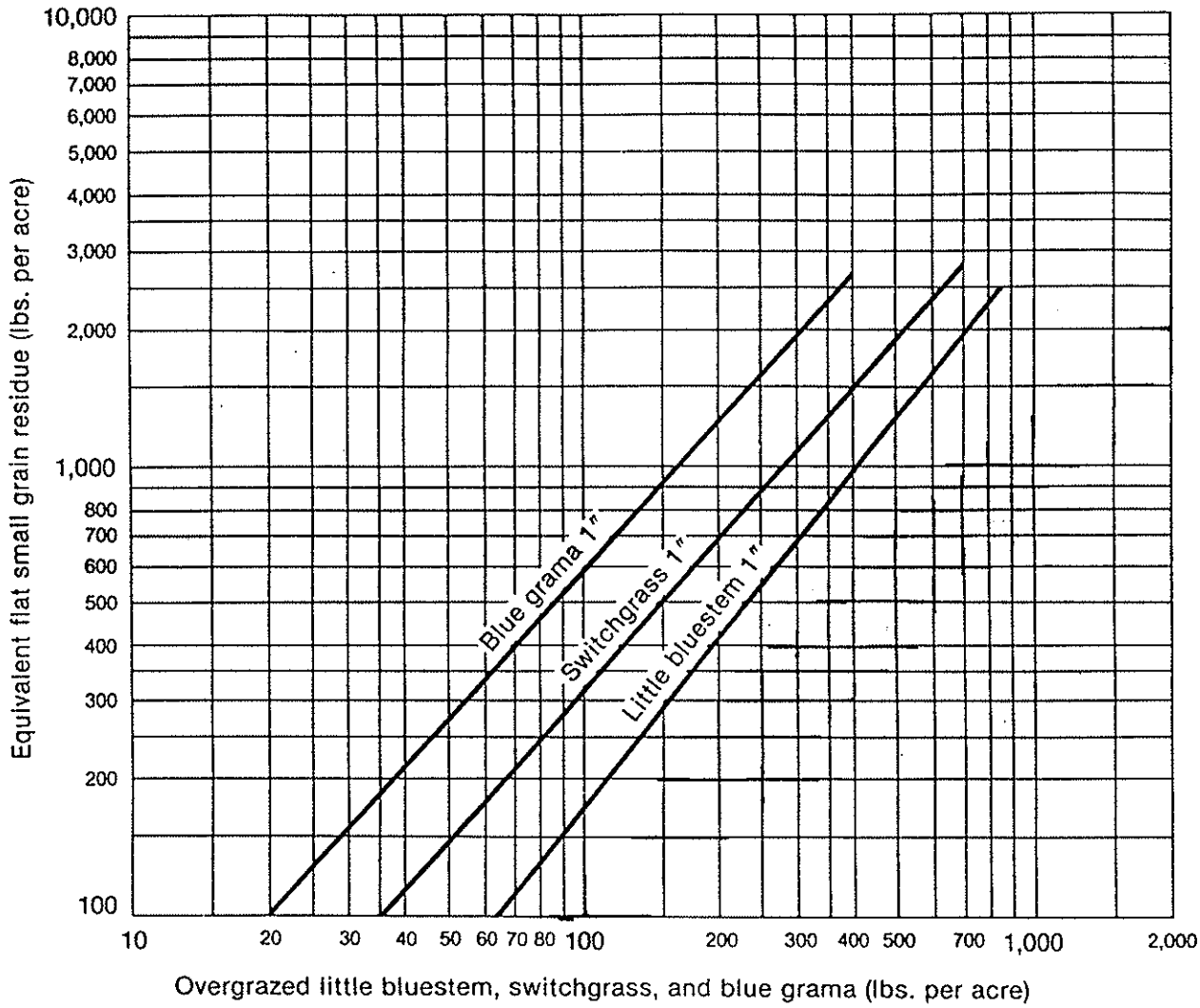


Source: Lyles and Allison - 1980 Journal Range Management, 33(2), pages 143-146.

CHART 1

1985

Flat Small Grain Equivalents of Overgrazed Little Bluestem, Switchgrass, and Blue Grama

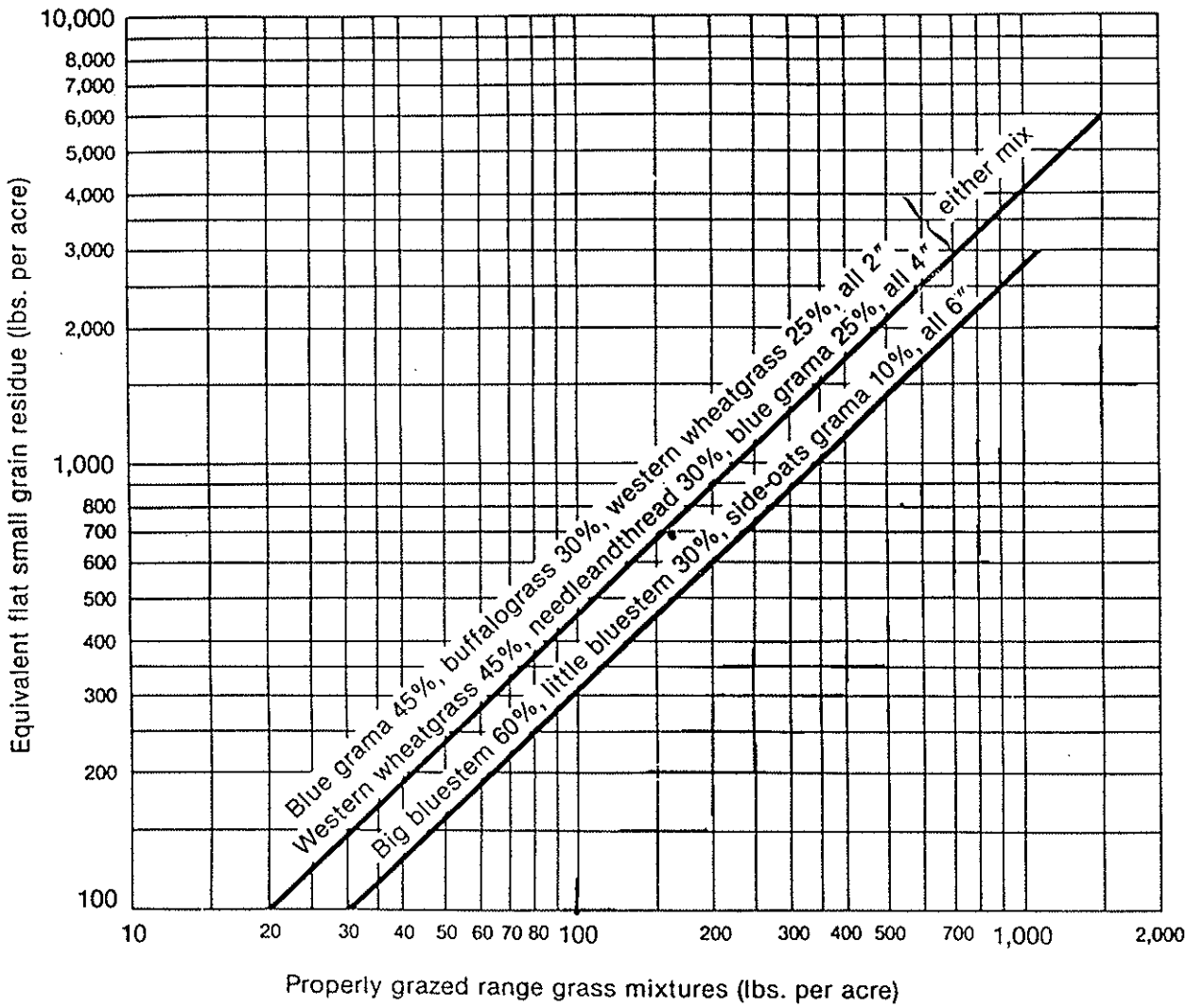


Source: Lyles and Allison - 1980 Journal Range Management, 33(2), pages 143-146.

CHART 1

1985

Flat Small Grain Equivalents of Properly Grazed Range Grass Mixture

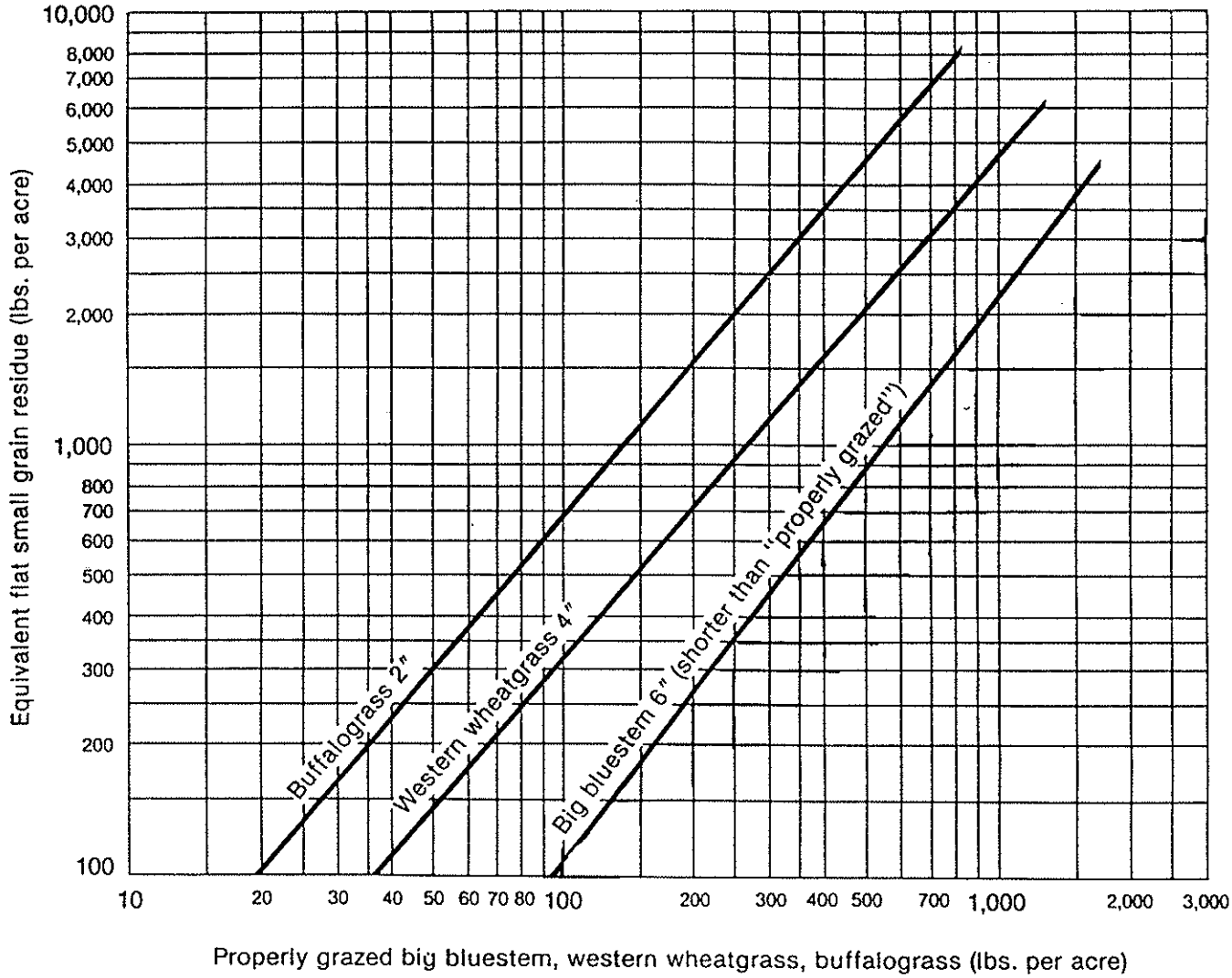


Source: Lyles and Allison - 1980 Journal Range Management, 33(2), pages 143-146.

CHART 1

1985

Flat Small Grain Equivalents of Properly Grazed Big Bluestem, Western Wheatgrass, and Buffalograss

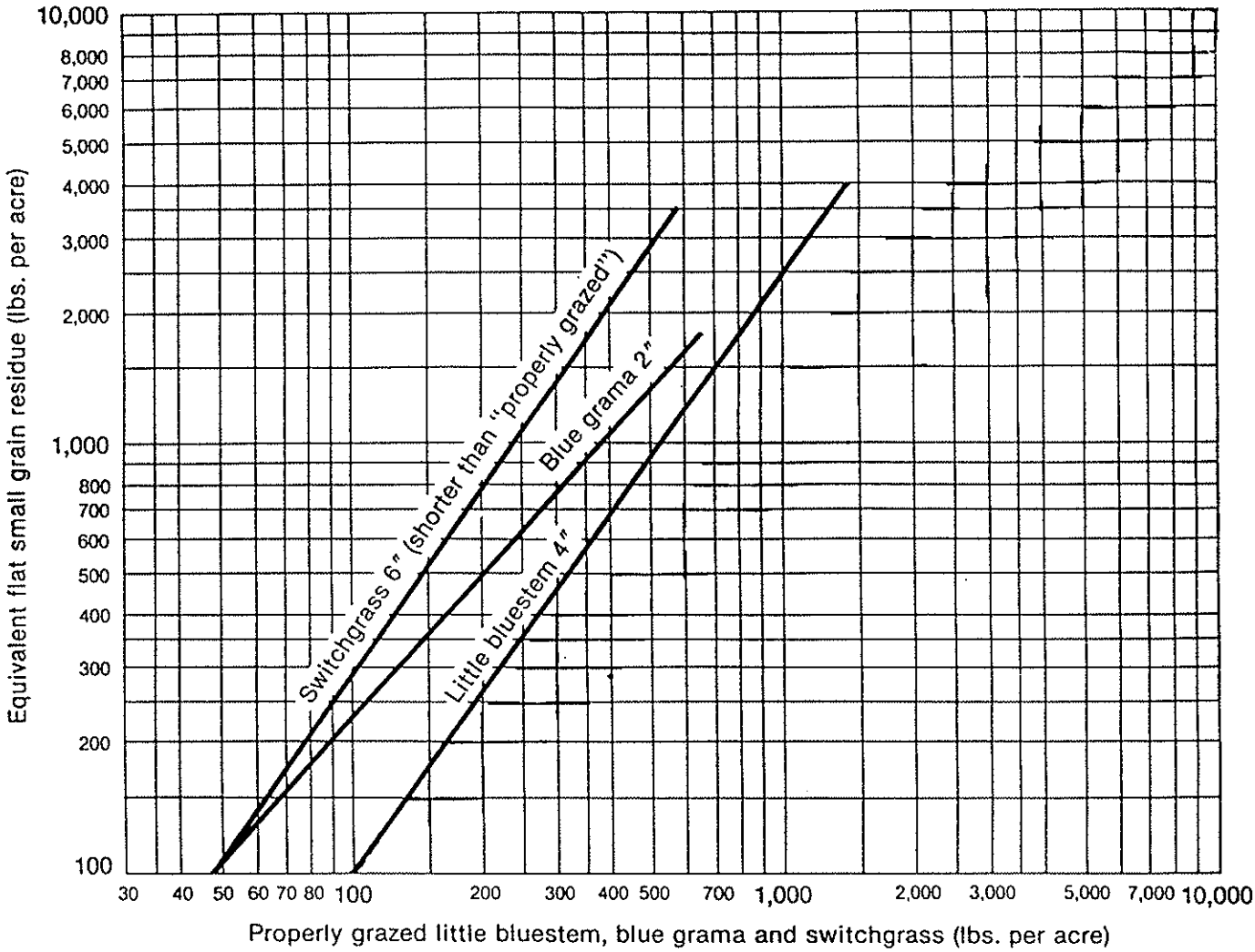


Source: Lyles and Allison - 1980, Journal Range Mangement 33(2), pages 143 - 146.

CHART 1

1985

Flat Small Grain Equivalents of Properly Grazed Little Bluestem, Blue Grama, and Switchgrass

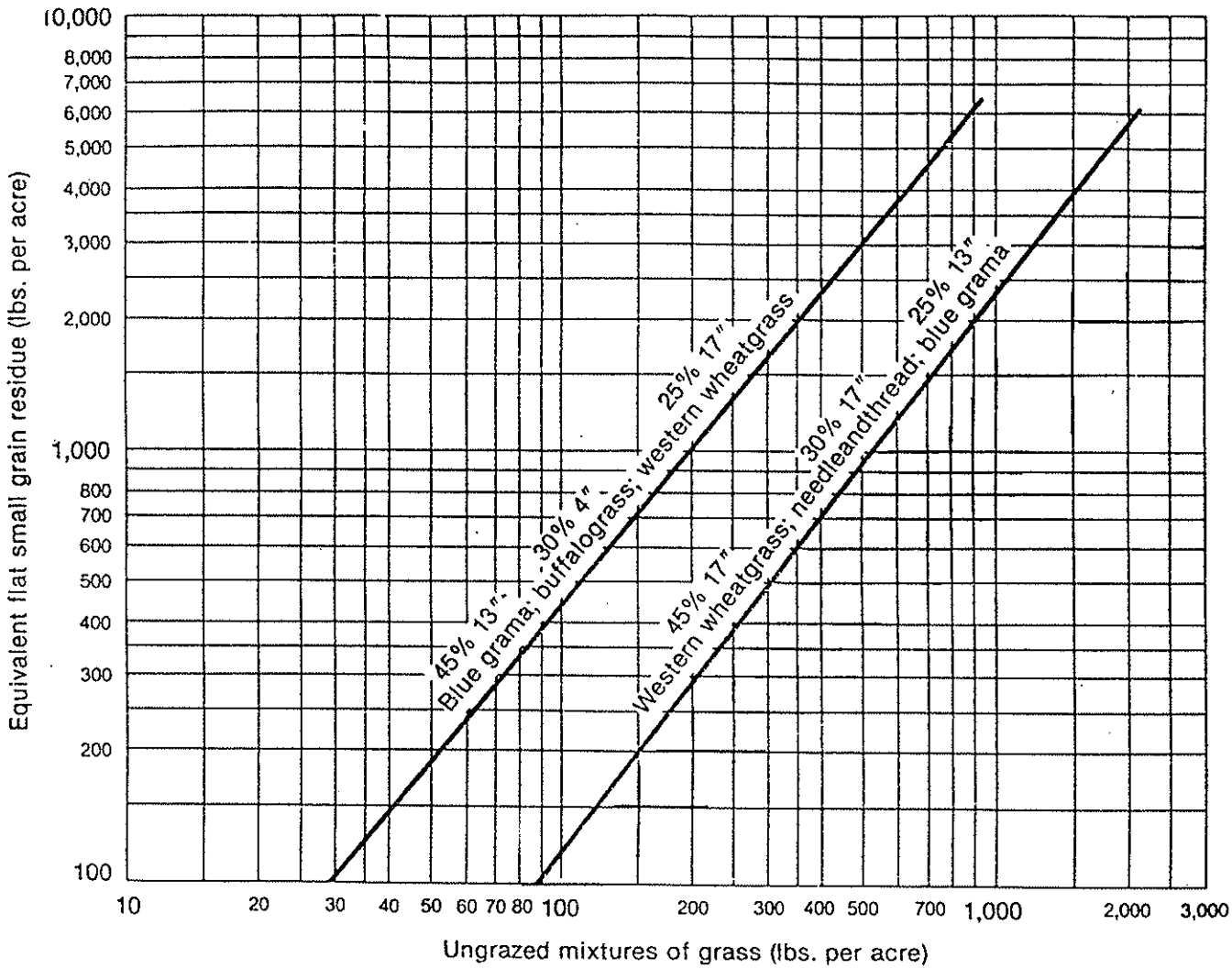


Source: Lyles and Allison - 1980, Journal Range Management 33(2), pages 143-146.

CHART 1

1985

Flat Small Grain Equivalents of Ungrazed Western Wheat, Needleandthread, Blue Grama, and Buffalograss Mixtures

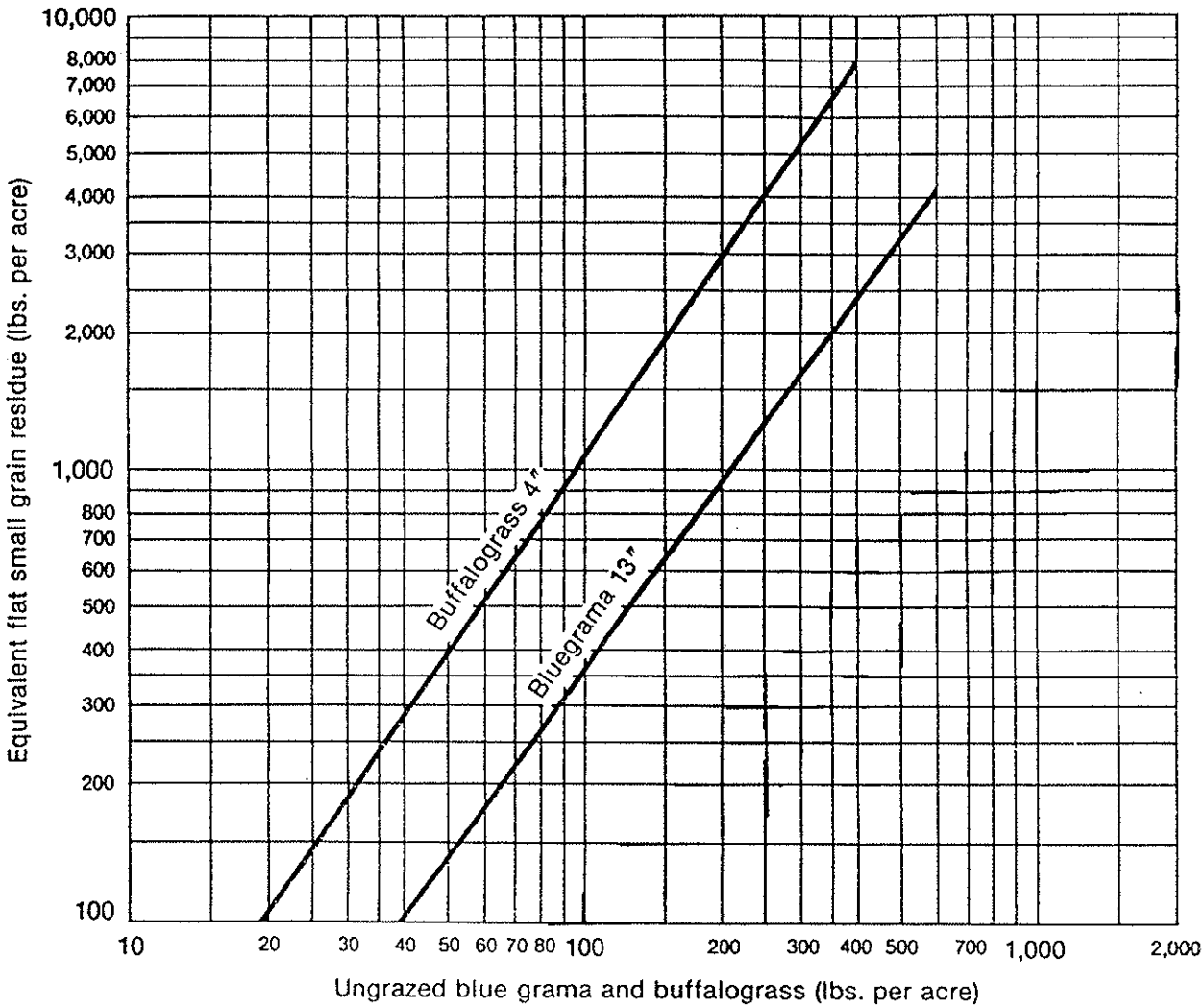


Source: Lyles and Allison - 1980, Journal Range Management 33(2), pages 143-146.

CHART 1

1985

Flat Small Grain Equivalents of Ungrazed Blue Grama and Buffalograss



Source: Lyles and Allison - 1980, Journal Range Management 33(2), pages 143 - 146.