USING GRID SAMPLES TO PREDICT WHOLE-FIELD RECOMMENDATIONS

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WHAT IS THE PURPOSE OF SOIL SAMPLING

- DETERMINE LIME AND FERTILIZER NEED FOR FIELDS
- PROVIDE RECOMMENDATIONS THAT ARE ECONOMICALLY AND ENVIRONMENTALLY SENSIBLE
- ASSESS AND MANAGE SPATIAL VARIABILITY OF SOIL TEST
- DEVELOP A NUTRIENT MANAGEMENT STRATEGY

DESCRIBING SOIL TEST VARIABILITY

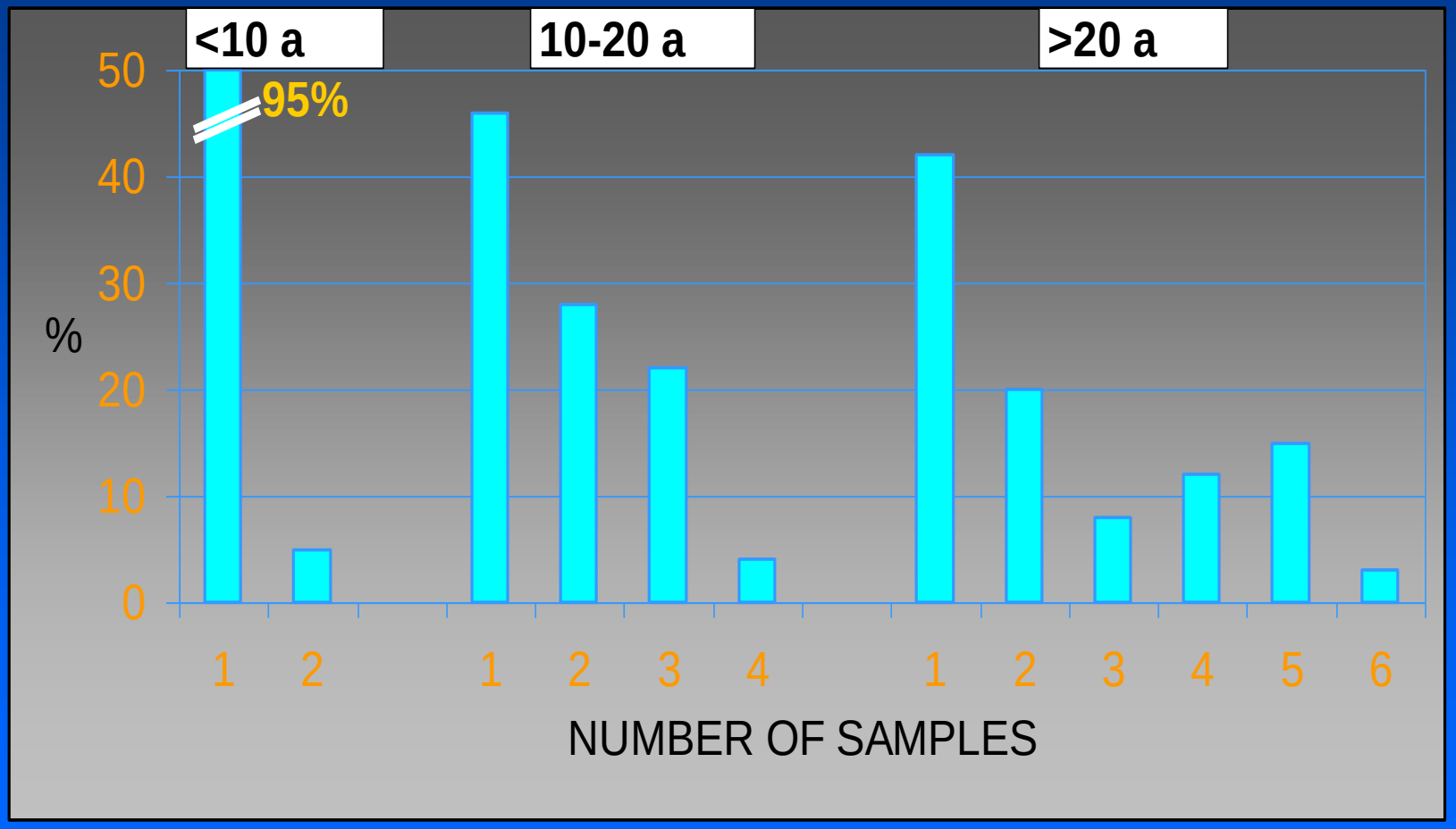
VARIABILITY CLASS	DISTANCE	SOURCE
MICRO	< 2”	PEDS vs. PORES MICRO MORPH.
MESO	2” – 6 ‘	FERT. BANDING CROP ROWS
MACRO	> 6 ‘	LANDSCAPE FIELD MGT.

JAMES AND WELLS, 1990

QUESTION: HOW MANY SAMPLES FOR A SINGLE-RATE TREATMENT

- SOIL TEST VARIES WITHIN FIELDS
- IS CURRENT SCHEME (1 SAMPLE/5 ACRES) REASONABLE
- # SAMPLES vs. # CORES
- EFFICIENCY vs. ACCURACY
- UWEX A2100 UNDER REVISION
- WHAT IS THE PRACTICE

1999 SPAL SURVEY – 912 REPORTS (KELLING AND PETERS)



PROPOSED A2100 REVISION

SUGGESTED NUMBER	FIELD SIZE
2	1 – 10
3	11 – 25
4	26 – 40
5	41 – 60
6	61 – 80
7	81 - 100

10 CORES/SAMPLE MINIMUM

VALUE OF MULTIPLE SAMPLES

- "AVERAGE OUT" HIGH TESTS
  - FERT. BANDS, MANURE SPOTS, FIELD ANOMALIES
- SAMPLE "DROPPED" IF P>5 ppm AND K>20 ppm
- DROP 1 IF 3 OR 4 SAMPLES; DROP 2 IF 5 OR MORE SAMPLES
- PROCEDURE WILL ALWAYS LOWER FIELD AVERAGE

SIMULATION OBJECTIVES

- DETERMINE EFFECT OF VARIOUS SAMPLING METHODS ON AVERAGE SOIL TEST
- USE GRID SAMPLED DATA TO SIMULATE ROUTINE SAMPLING
- COMPARE CELL SIZE AND CORES PER SAMPLE
- WITH AND WITHOUT UW OUTLIER REMOVAL METHOD

PROCEDURE

- SIX FIELD OF AT LEAST 50 ACRES
- GRID-POINT SAMPLED ON ONE ACRE
- SEMI-VARIOGRAM ANALYSIS TO VERIFY SPATIAL RELATIONSHIP
- CREATE 50 FT. GRID FROM DATA
- SUPER-IMPOSE 5, 10, 15 ACRE CELLS WITH 5, 10, OR 20 CORES
- COMPARE TO GRAND MEAN

WHOLE FIELD SOIL TEST P

FIELD	AVG.	MIN.	MAX.
CALDWELL	64	21	200
STONE CORP	39	20	100
WATZKE	50	12	195
FAULKNER	43	17	95
FPD	39	8	208
HART	86	33	200

AVERAGE OF GRID SAMPLES

WHOLE FIELD SOIL TEST K

FIELD	AVG.	MIN.	MAX.
CALDWELL	220	130	645
STONE CORP	177	110	360
WATZKE	198	95	440
FAULKNER	174	115	320
FPD	188	62	464
HART	157	40	369

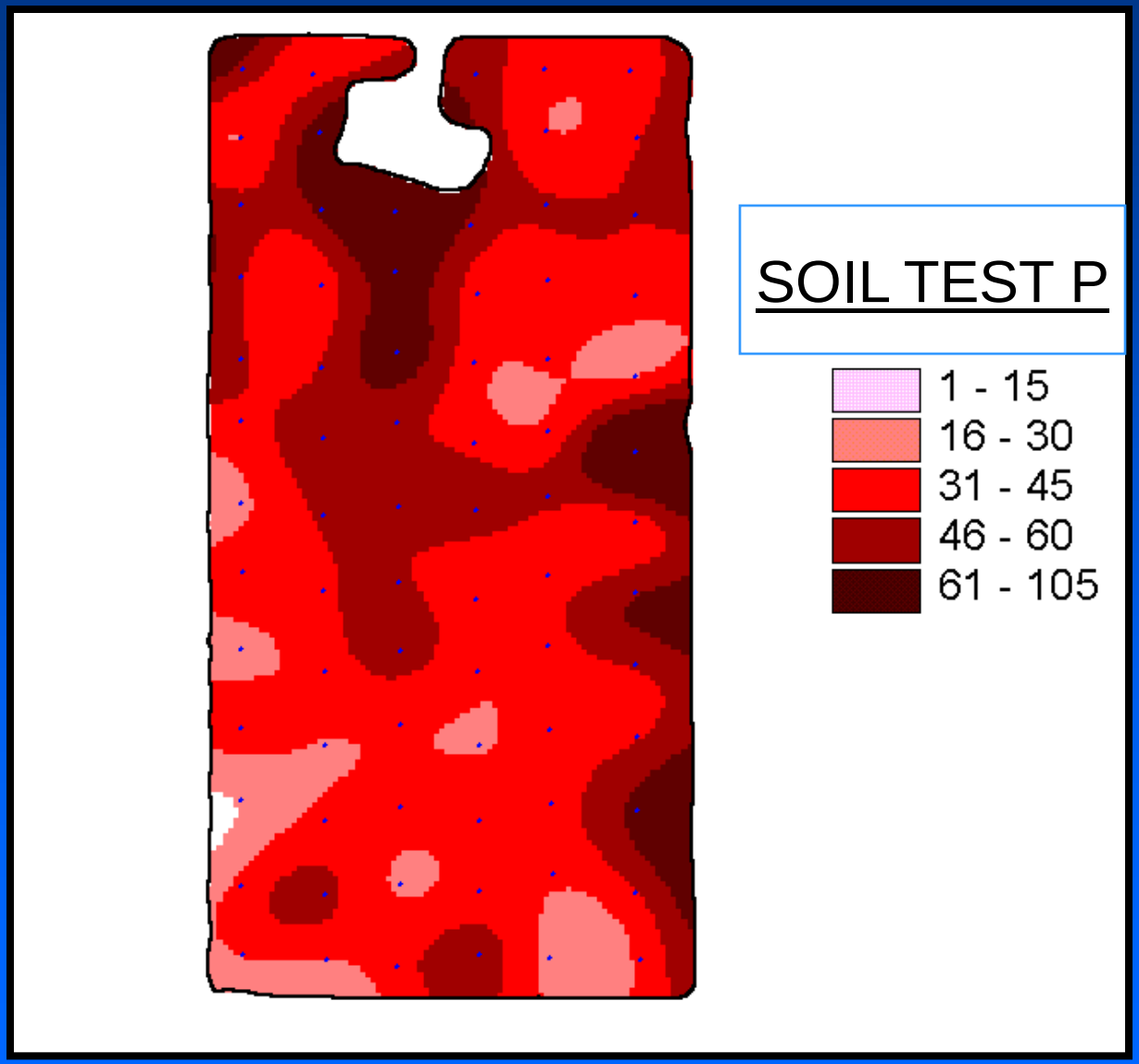
AVERAGE OF GRID SAMPLES

WHOLE FIELD SOIL pH

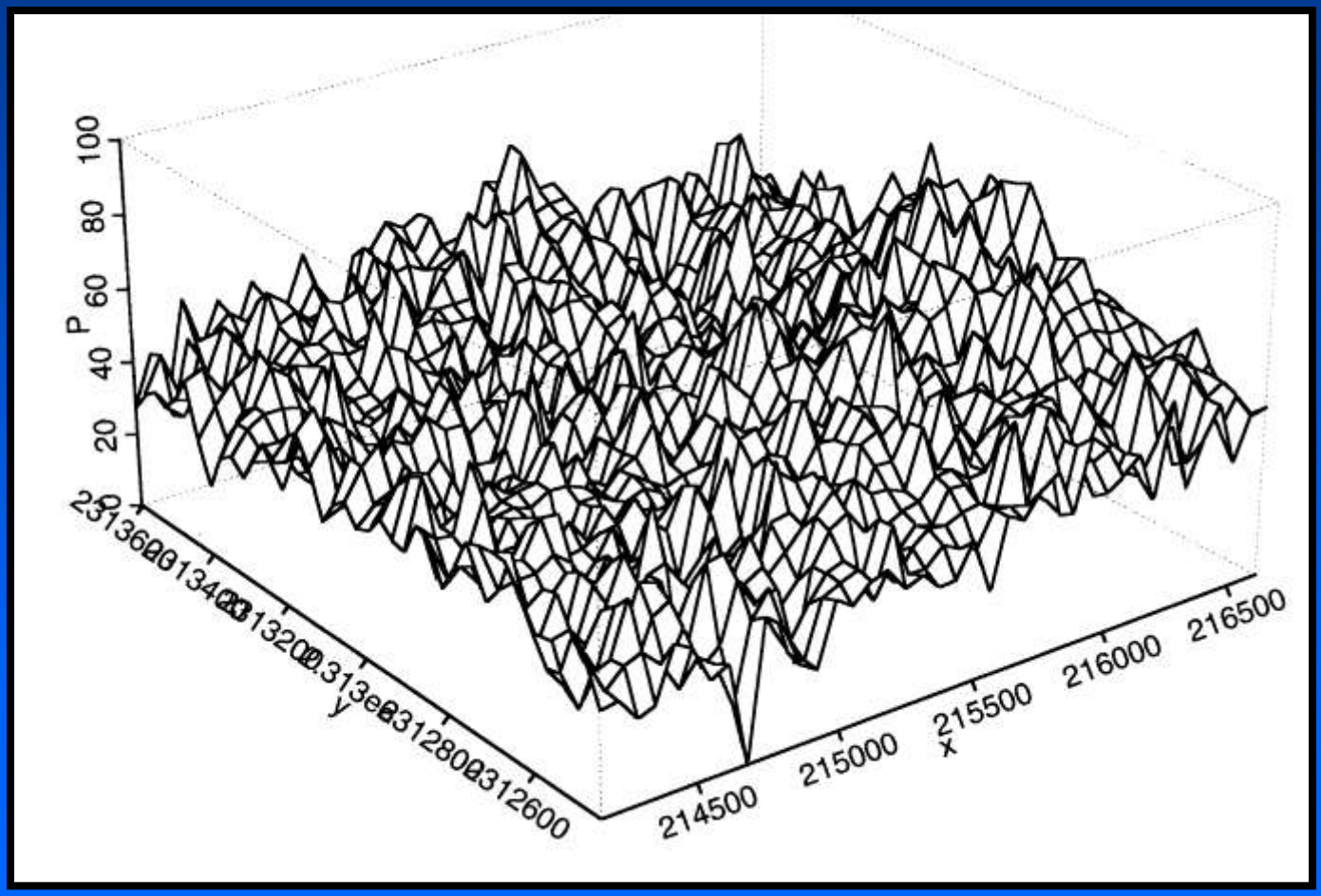
FIELD	AVG.	MIN.	MAX.
CALDWELL	6.5	5.8	7.5
STONE CORP	6.5	5.9	7.0
WATZKE	6.5	5.3	7.7
FAULKNER	5.5	4.9	6.2
FPD	6.6	5.8	7.4
HART	6.7	5.8	7.6

AVERAGE OF GRID SAMPLES

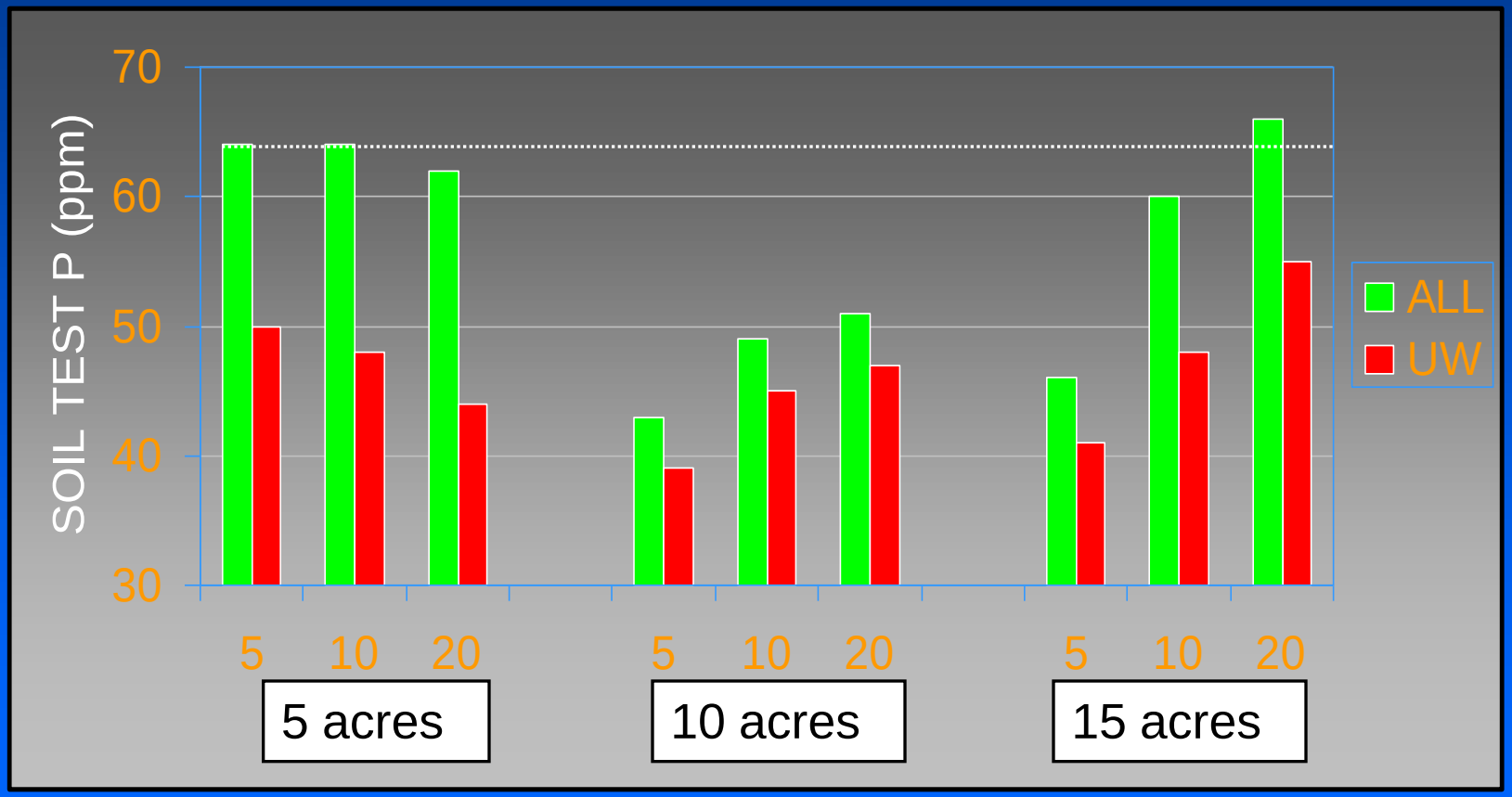
CONTOURED SOIL TEST P FOR FAULKNER FIELD



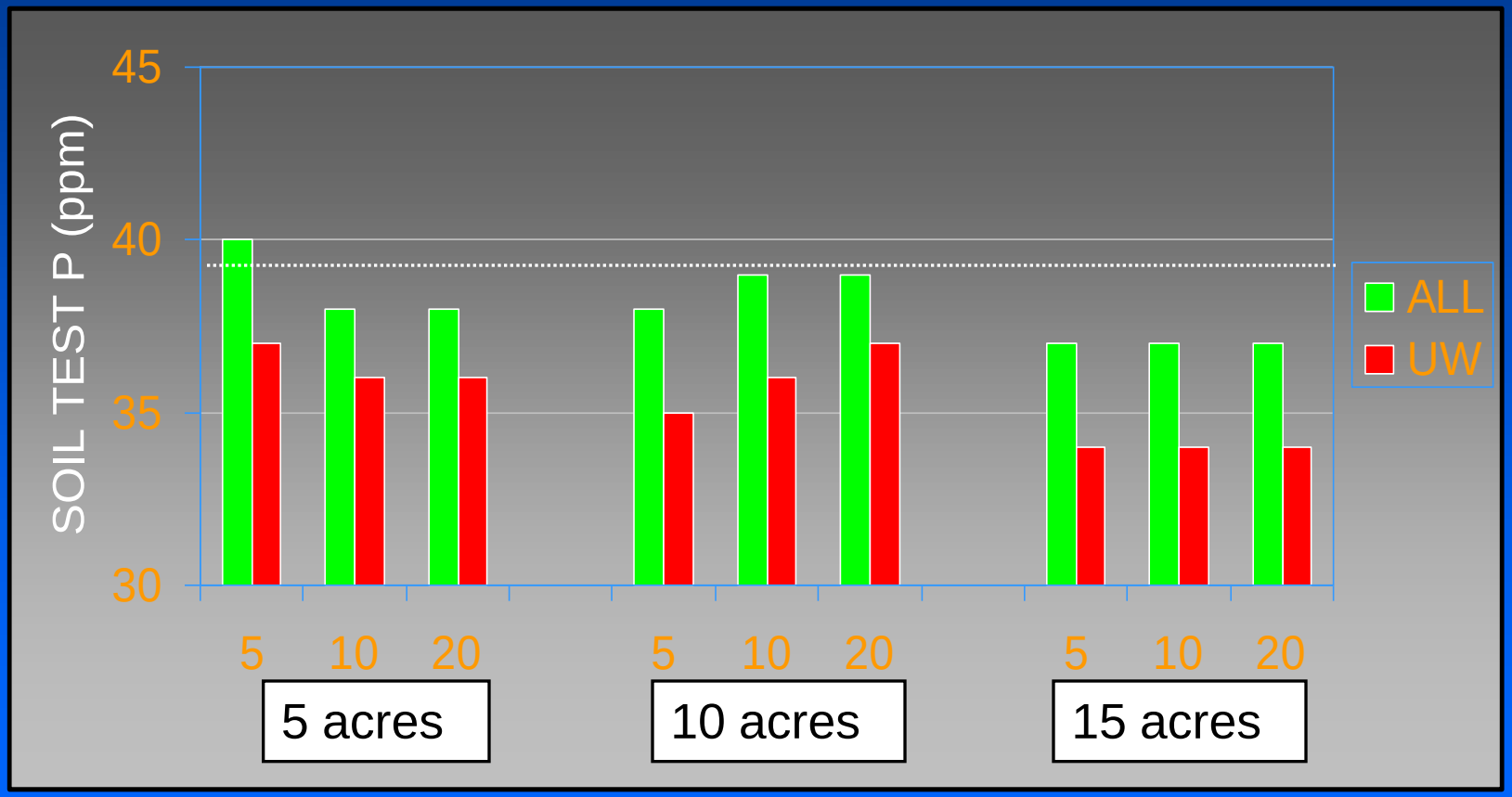
GRIDDED SOIL TEST P FOR FAULKNER FIELD



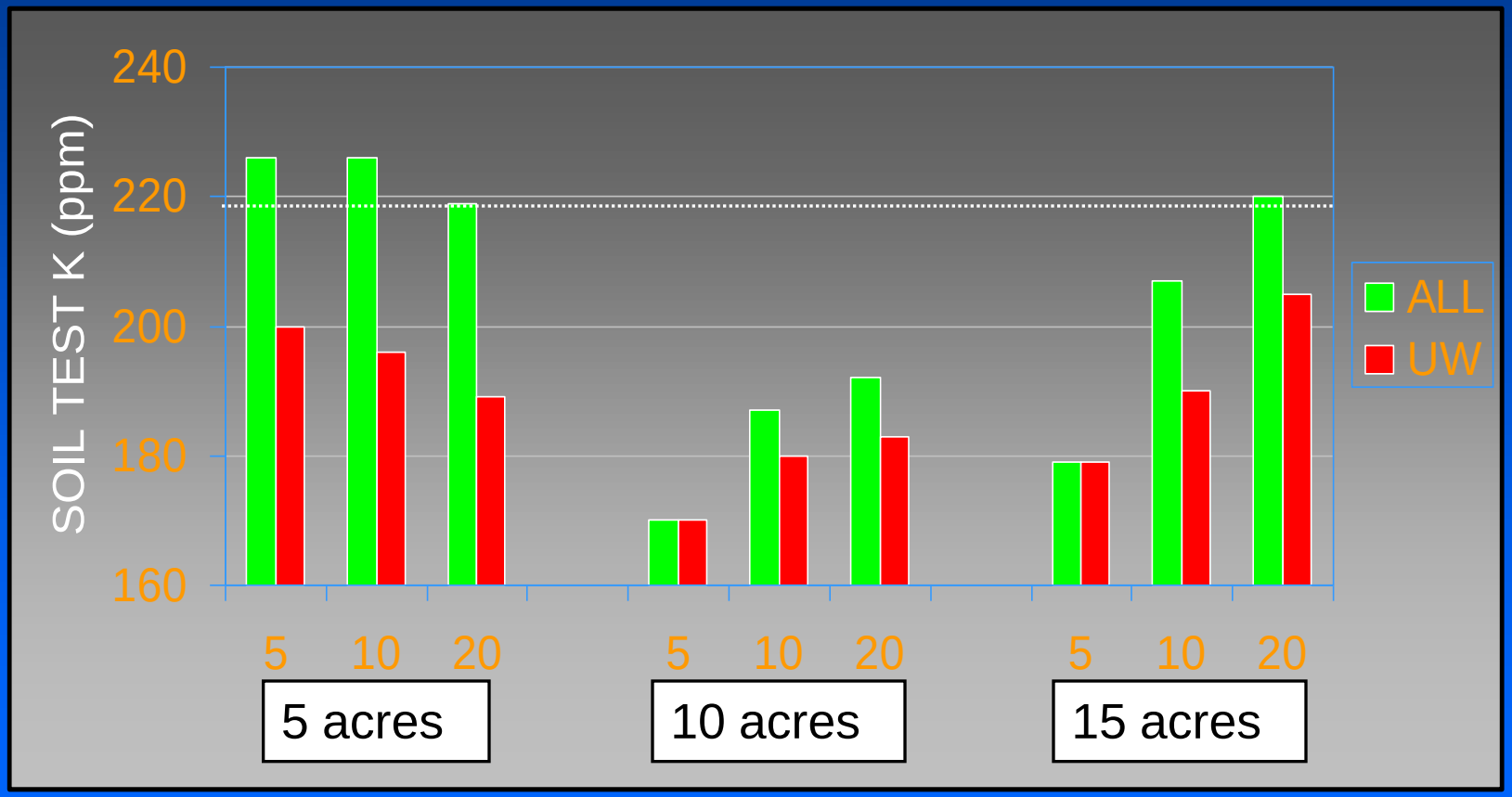
SAMPLING SCHEME AND SIMULATED AVERAGE SOIL TEST P (CALDWELL)



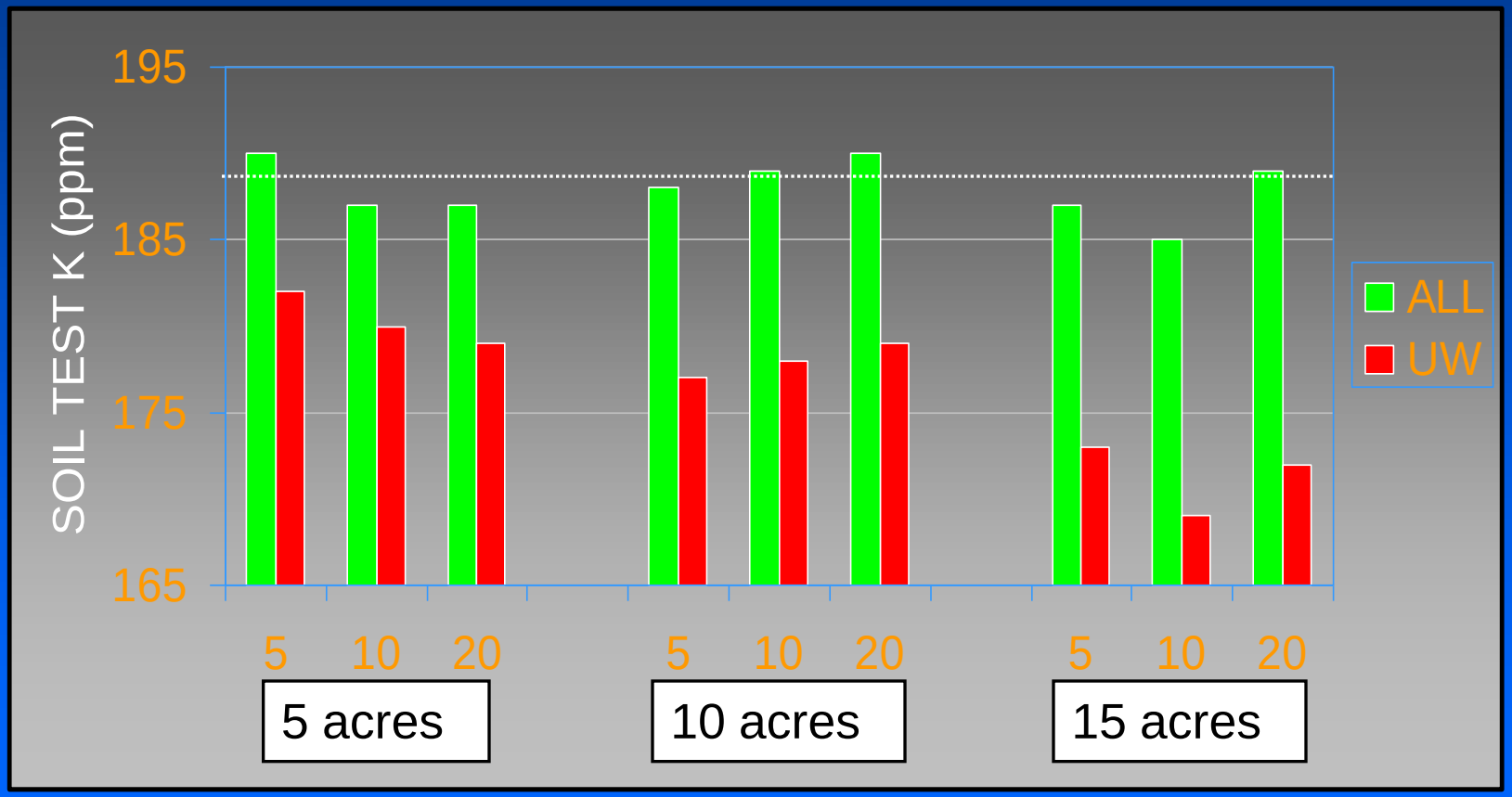
SAMPLING SCHEME AND SIMULATED AVERAGE SOIL TEST P (FPD)



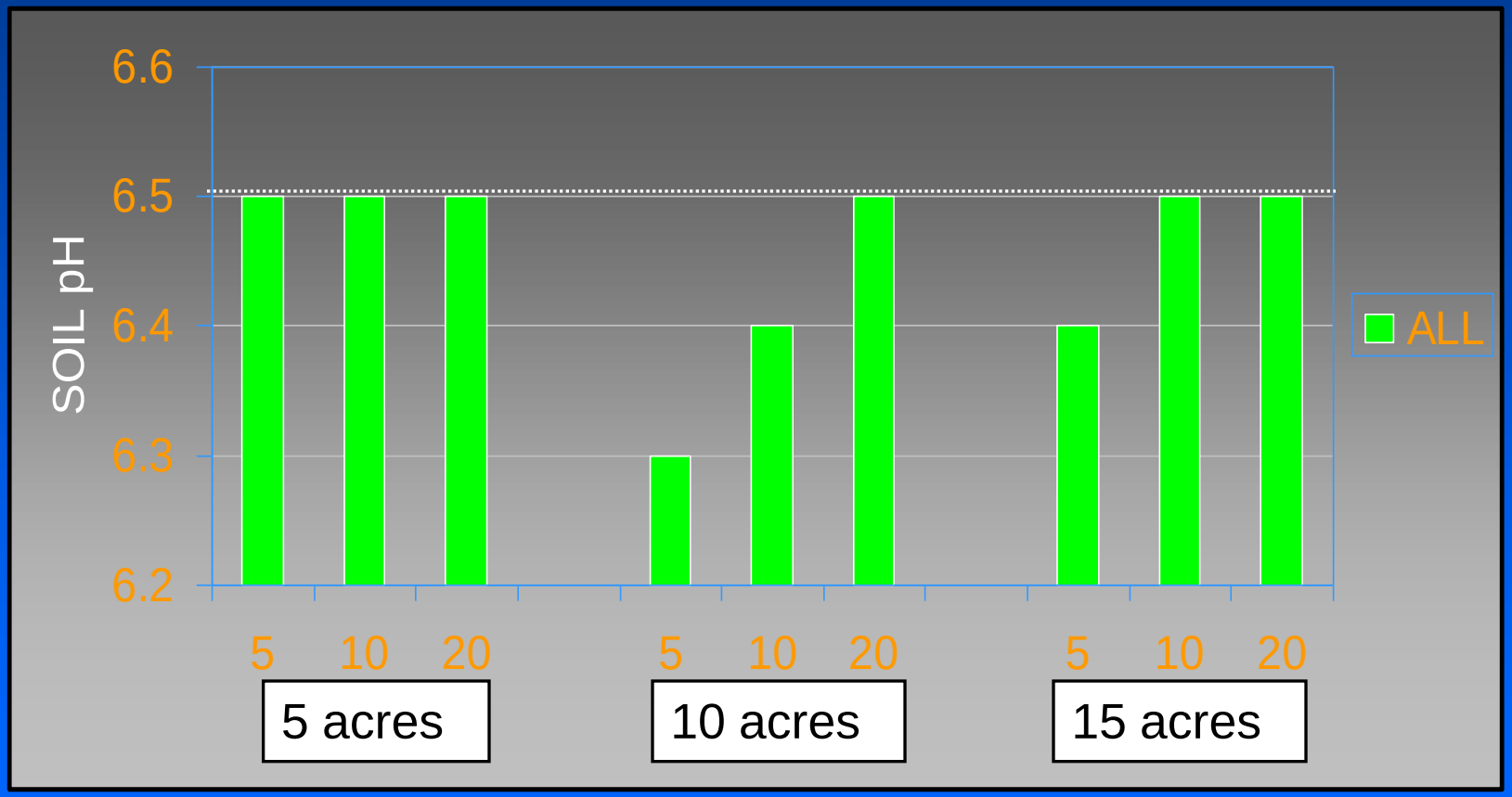
SAMPLING SCHEME AND SIMULATED AVERAGE SOIL TEST K (CALDWELL)



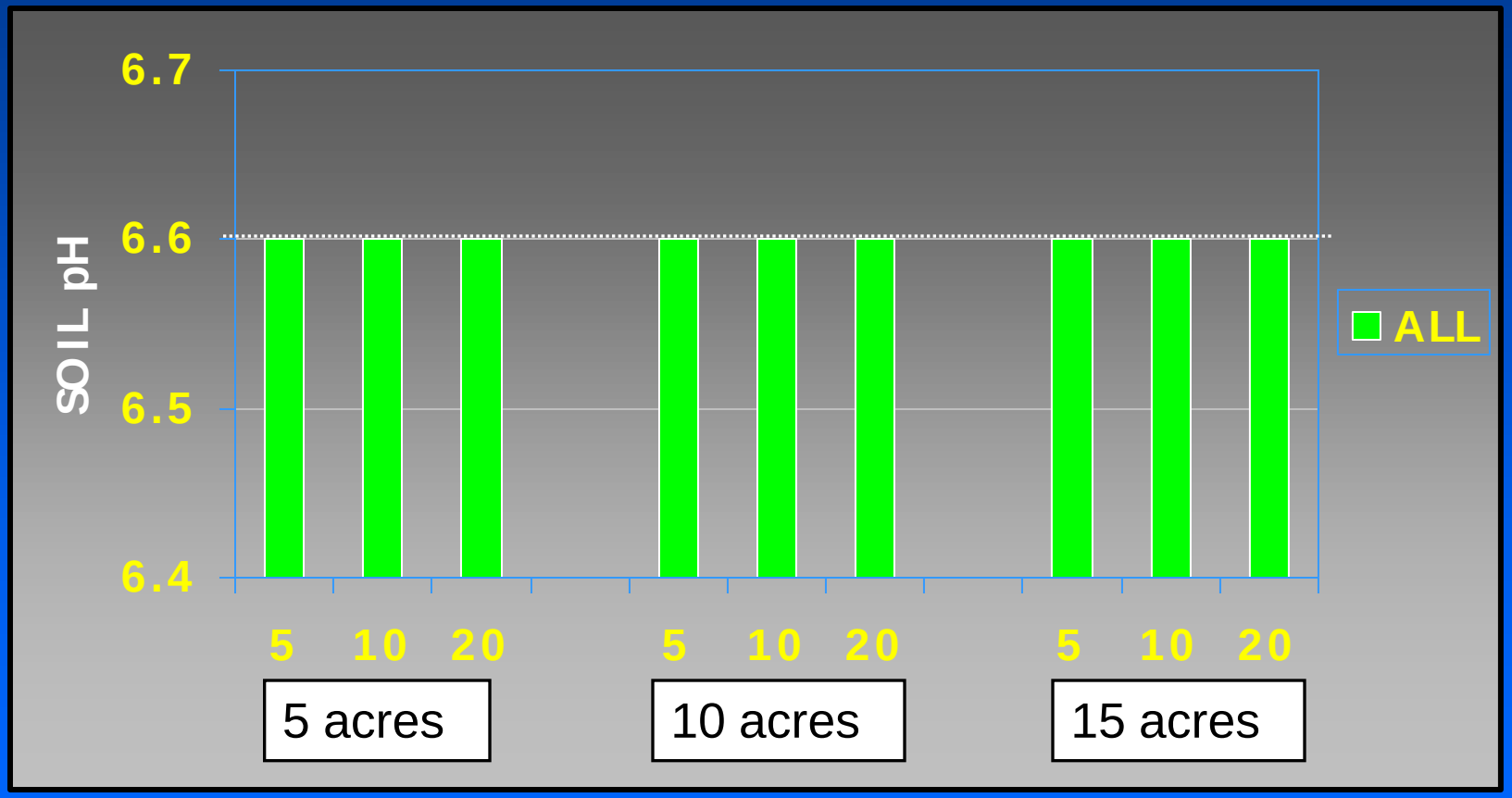
SAMPLING SCHEME AND SIMULATED AVERAGE SOIL TEST K (FPD)



SAMPLING SCHEME AND SIMULATED AVERAGE SOIL pH (CALDWELL)



SAMPLING SCHEME AND SIMULATED AVERAGE SOIL pH (FPD)



SUMMARY

- SIMULATED ROUTINE SAMPLING FROM GRID SAMPLED DATA
- SIX FIELDS
  - >50 acres
  - ALL EH, WELL LIMED
- 5, 10, 15 ACRE CELLS WITH 5, 10, OR 20 CORES
- COMPARE AVERAGE AND DROPPING OUTLIERS

SUMMARY (cont.)

- TRENDS SHOW LOWER SOIL TEST WITH "COARSER" SAMPLING
- VARIATION BETWEEN FIELDS
- DROPPING OUTLIERS LOWERS SOIL TEST
- SAMPLE DENSITY MORE IMPORTANT IN RESPONSIVE FIELDS
- RECOMMENDATION FOR FEWER SAMPLES, WITH MORE CORES IS JUSTIFIED