



**Rotation “B” & “C” at Scott:
100 years and still growing**

Reynald Lemke

Agriculture & Agri-Food Canada, Saskatoon
(Reynald.lemke@agr.gc.ca)

An Act Respecting Experimental Farm Stations, (June 1986)

- Established five experimental farms, Ottawa (ON), Napan (NS), Brandon, (MB) Indian Head, (NWT) and Agassiz (BC)
- Stated objectives were: “The testing of crops, livestock housing, nutrition and management of animals, and the use of manure as a fertilizer”
- First recorded long-term study (1886 – 1910)
oat-barley-wheat-fodder beats–turnip-corn

“...in the soil, a large store of fertility has been laid up... which may ... be continually added to and improved, but by careless and injudicious management may be prodigally wasted...”

W. M. Saunders - Director of Experimental Farms, 1893




Multiple Site Long-term Rotation Studies (est. 1911)

- Fallow – wheat (*2 year*)
- Fallow – corn/sunflower – wheat – oat – fallow – wheat – oats – hay – hay (*9 year*)

| System | Average Yield | Average cost | Profit on Crop | Profit on Rotation |
|--------|---------------|--------------|----------------|--------------------|
| | acre | \$ / acre | \$ / acre | \$ / acre |

Source: Dominion of Canada Department of Agriculture Bulletin # 98 - 1928

| | | | | |
|--------------|------|------|-------|------|
| Fallow-Wheat | 25.9 | 41.8 | 11.56 | 5.68 |
|--------------|------|------|-------|------|



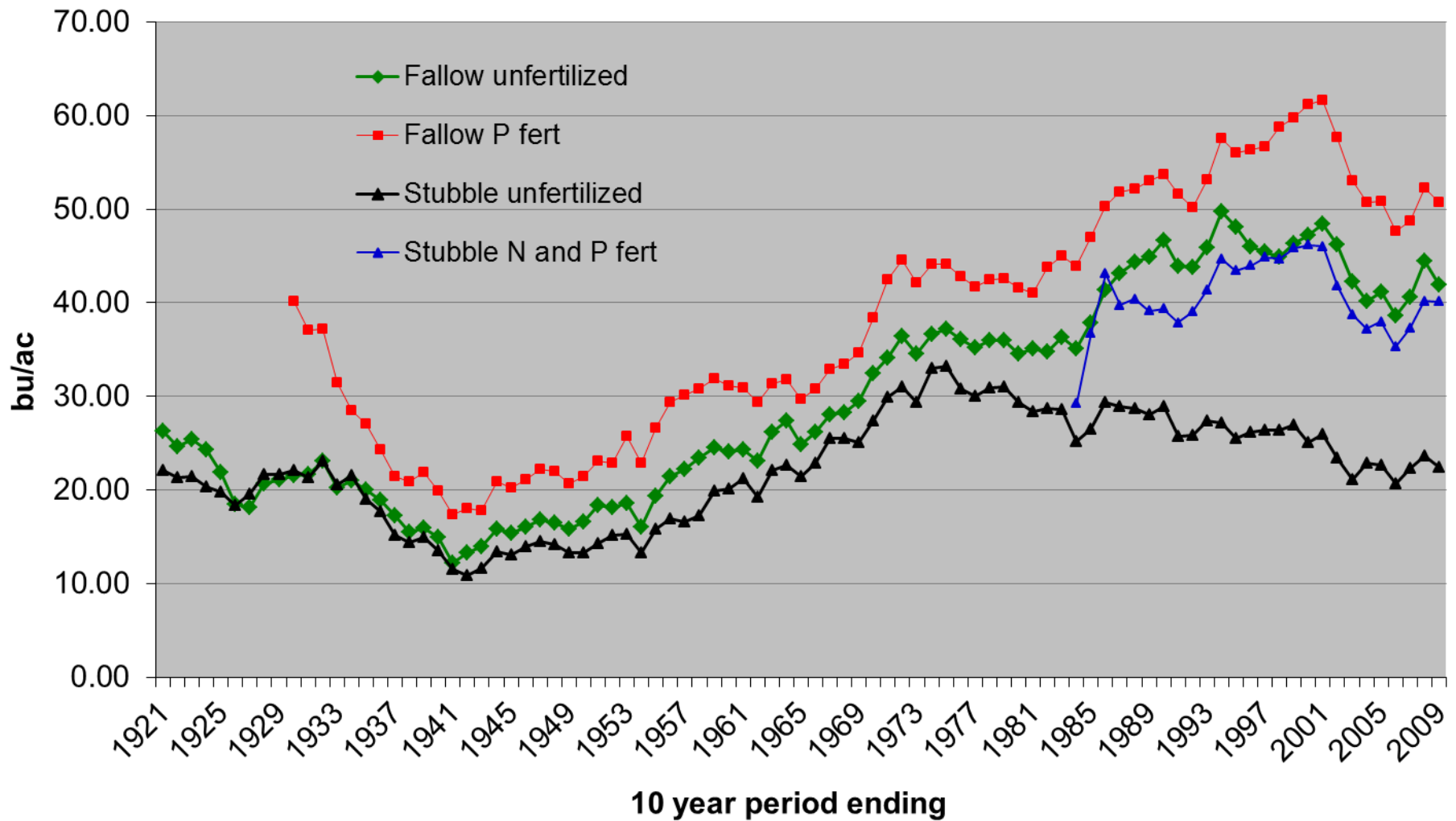
Average Crop and Input Values: 1911 - 1926

| Category | Value (\$) |
|--------------|-------------|
| Labour | 0.24 / hour |
| Horse labour | 0.85 / hour |
| machinery | 1.06 / acre |
| Land Rental | 2.50 / acre |
| Wheat | 1.18 / bus |
| Oats | 0.40 / bus |
| Barley | 0.56 / bus |

Source: Dominion of Canada Department of Agriculture Bulletin # 98 - 1928

- Rotation C = fallow-wheat-wheat;
Rotation B (re-established 1921) = fallow-wheat
- Grain threshing (1928?) with a combine retained crop residues in the field.
- 1930 the Rotation C plots split and P fertilizer added to wheat phases
- 1984 N fertilizer applications to wheat on stubble (1 in 3 years); P applications started to rotation B
- Chemical weed control, first broadleaf weeds (1948) and later grassy weeds (1970).
- No-till management (2000)
- New wheat varieties were adopted every 4 to 6 years.

98 Years of Wheat Yield at Scott



- 20 to 50% of year to year variability related to early season precipitation
- fertilizer increased yield by 22% & 50%

- Input and Export of N not balanced ~ -10 lbs of N (300 lbs in 30 yrs); unfertilized -20 lbs on N (about 600 lbs in 30 yrs)
- SON levels in 1916 ~ 0.28%; in 1940 ~ 0.20%; in 2013 ~ 0.18% (comparisons across time very approximate)
- Based on differences between fertilized vs. unfertilized then SON would have been draw down of 325 kg **but** no measurable difference in 2013.....????
- Apparent N recovery (fertilized grain N – unfertilized grain N /fertilizer N applied) approximately 70%.

- Input and Export of P approximately balanced for P fertilized treatments (unfertilized ~ 500 lbs of P in 83 yrs)
- Results from Lethbridge “sister study” indicate no significant impact on grain quality (micro-nutrient concentrations) status
- Results from Lethbridge “sister study” indicate that continuous wheat cropping with N fertilizer has higher microbial biomass than continuous wheat no N and rotation C
- N functional gene abundances higher where N fertilizer applied (genes involved in key N transformations)

Thanks for your attention!!!

