

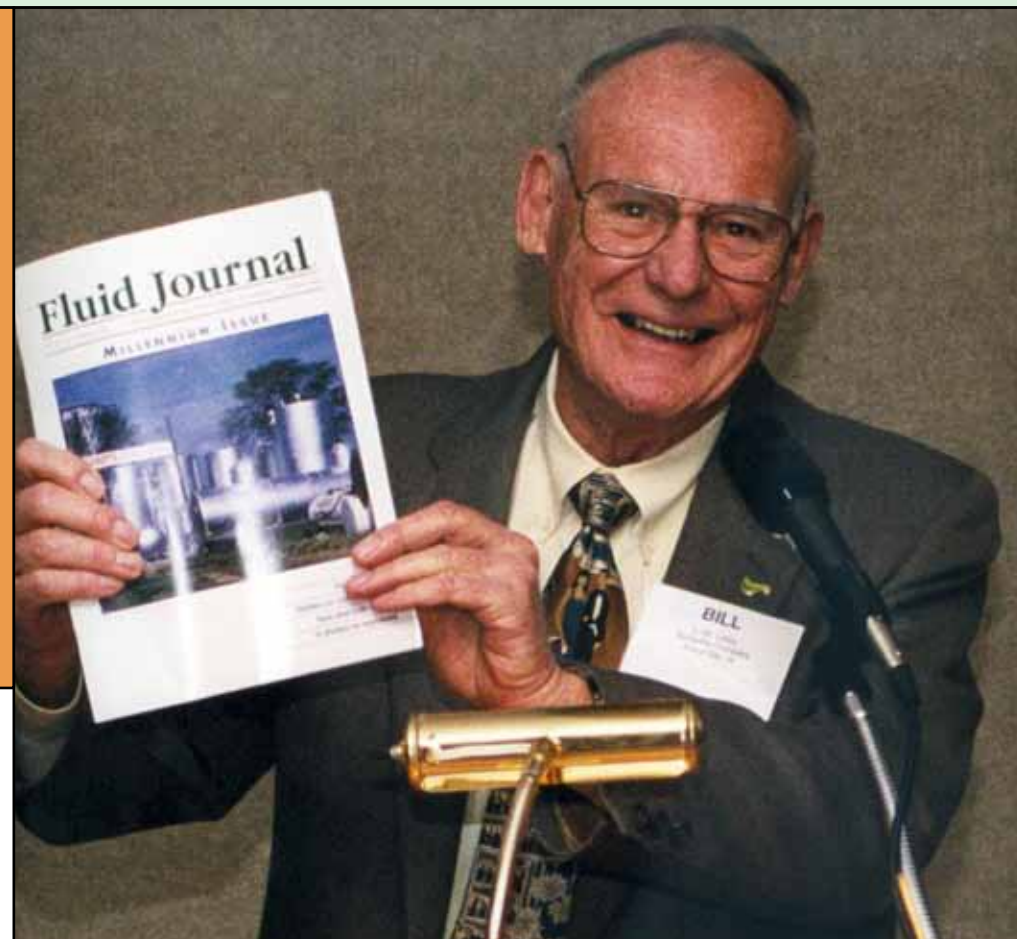
# Chronology of a Dream

How one man worked to put the fluid concept on the world market.

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**Summary:** These are some excerpts from a diary of my dad's, Bill Lohry, who was founder of Nutra-Flo Company and an ardent (and I don't say that lightly) promoter of fluid fertilizers. A consummate educator, his desire was to improve American agriculture through challenging and informative slide presentations to growers and the dealers servicing them. Below is a chronological listing of some of those presentations, including commentary by him that provides insight into some of the struggles he went through in creating and growing a vibrant new enterprise—the fluid fertilizer industry.



The year 1971 was the 18th year since the introduction of a fluid fertilizer into the United States. The National Fertilizer Solutions Association (NFSA) decided to celebrate this occasion. Although the period up to 1971 was exciting, the successive harvests in those 18 years had reduced the fertility of the once rich prairie soils. Since my dad was also president of the NFSA for that year, in addition to his duties as President of Nutra-Flo, he decided to use this occasion to produce a three-screen slide show. The show used three 8-foot by 8-foot screens standing side by side. Images filled the individual screens or sometimes a single image spanned all three screens. All were supported by stereophonic sound with narration and music. He wrote NFSA members and asked them to send in their old slides so he could show how our industry had advanced over this period. He was surprised at the number of slides sent in. When they were arranged in chronological order they represented how our development of original equipment was rapidly replaced by improved equipment. In effect, my dad would be entering a

part of a free enterprise system that ultimately would fuel a revolution that tripled yields.

## Evolving stages

In the early years my dad focused the slide presentations on how to increase soil fertility and other techniques to improve yields. Nutra-Flo produced over 50 programs between 1967 and 1997. Topics varied but all were designed to promote the advantages of fluid fertilizer and challenge the grower to improve his yields through better farming practices. Some of the topics, while at times revolutionary, are still relevant today. Explored were the physical and chemical aspects of nitrogen, phosphate, and potash. Should the next year be dry, ways were explored on how to save rainwater via contour tillage and residue management that would collect snow. Efforts were made to

solve problems that occurred the year before. For example, the next year's slide program might present solutions to compaction problems that reduced yields. One of the most important problems was that of plant population per acre. This involved row width. Since the days of horses were gone and we no longer required 40-inch rows, why not plant 30- or 20-inch rows? In the slide program, titled "Maximizing Soil Productivity," graphics were presented on how to build the soil structure deeply (down to 18 inches) to support more plants, with the ultimate goal to produce 300 bushels of corn per acre!

## Summing up

What follows should give you a good idea where his slide programs promoting fluid fertilizer technology led, starting in the early stages where national corn grain yield averaged

35 bushels per acre and ending up pushing near 400 bushels per acre in yield contest trials.

- **Easier, Faster, Better (1967).** Explained the different methods of applying liquid fertilizer: starter fertilizer, fertigation, uniformity, deep placement, and banding
- **The Better Way (1969).** How to make the most of rainfall, new tillage methods, fertilizing wheat, soybeans, and pastures.
- **The Liquid Revolution (1971).** A walk through the first two decades of the liquid fertilizer business
- **The Lesson of the Teotihuacans (1971),** who grew continuous corn in Mexico, exhausting their soil after several hundred years. Our civilization is the only one in history that learned the secret to replacing nutrients removed by crops.
- **Good Programs Raise Bigger Yields in Any Weather (1973).** Water Use Efficiency (WUE) is a measure of the bushels of corn vs. inches of rain and one of the farmer's biggest problems or greatest benefits.
- **The Promised Land (1974),** a three-screen production relating the history of how pioneers conquered the land and developed other implements to improve farming efficiency.
- **The Kernel of Gold (1974),** single-screen production telling non-farmers how local farmers used fertilizer and why it is necessary for food production.
- **Zinc the Miracle Worker (1975),** a three-screen production that covered the zinc fertilizer program from beginning to end: how to test for deficiency, mixing directions, how zinc reacts in various soils, the equipment needed, and the costs involved.
- **A Generation of Progress (1975),** a three-screen, 273-slide production presented at the Annual National Meeting of the NFSA with approximately 2,500 in attendance. It was also presented to farmers in Nebraska, Iowa, and South Dakota. Looking back at the time, we didn't imagine that in another generation (by 2005) farmers would be growing 180 bushels of corn an acre (Figure 1), with some field tests approaching 400!
- **Selling the Advantages of Fluid Fertilizers (1977),** a three-screen production presented to 100 fertilizer dealers in Baltimore, Maryland, wanting to know how to handle and sell fluid fertilizers and who now use these products.
- **Water Management for High Yields (1977).** This three-screen production followed the dry year of 1976. We explored climate, which has so much effect on yield. Given was the example of how one university determined that fertilized corn requires 5,600 gallons of water per bushel, whereas unfertilized corn requires 21,000 gallons of water per bushel. What music to the ear!
- **Starter Fertilizer (1977),** 78 slides. This program discussed various formulations and equipment used to apply starter fertilizer (now in wide use in the Corn Belt). Basically a stream of water-soluble fertilizer containing a mixture of N, P, K, S, Zn is applied below and to the sides of seed corn when it is planted.
- **New Concepts for Maximizing Yields (1978).** This hour-long program showed interviews we'd taken of a large number of successful farmers and their programs. It is almost breathtaking when we look up and see now how we'd accumulated and passed on new ideas from farmers and university researchers, all developed in order to help other farmers increase yields and profits.
- **What High Yields Have to Tell Us (1979),** a 45-minute slide presentation. For the first time Herman Warsaw was mentioned, describing how he produced 338 bushels of corn per acre on land the government had placed a potential yield of 38 bushels an acre! Also discussed was how he later produced 377 bushels per acre, a record for dryland corn. We also discussed how no other local farmers fertilized, tested their soil, changed their tillage, etc.
- **Six Ways to Increase Your Profits (1980),** 80-minute slide program with six big new ideas:
  1. Improving your WUE by tillage, narrow rows, and fertilizing properly

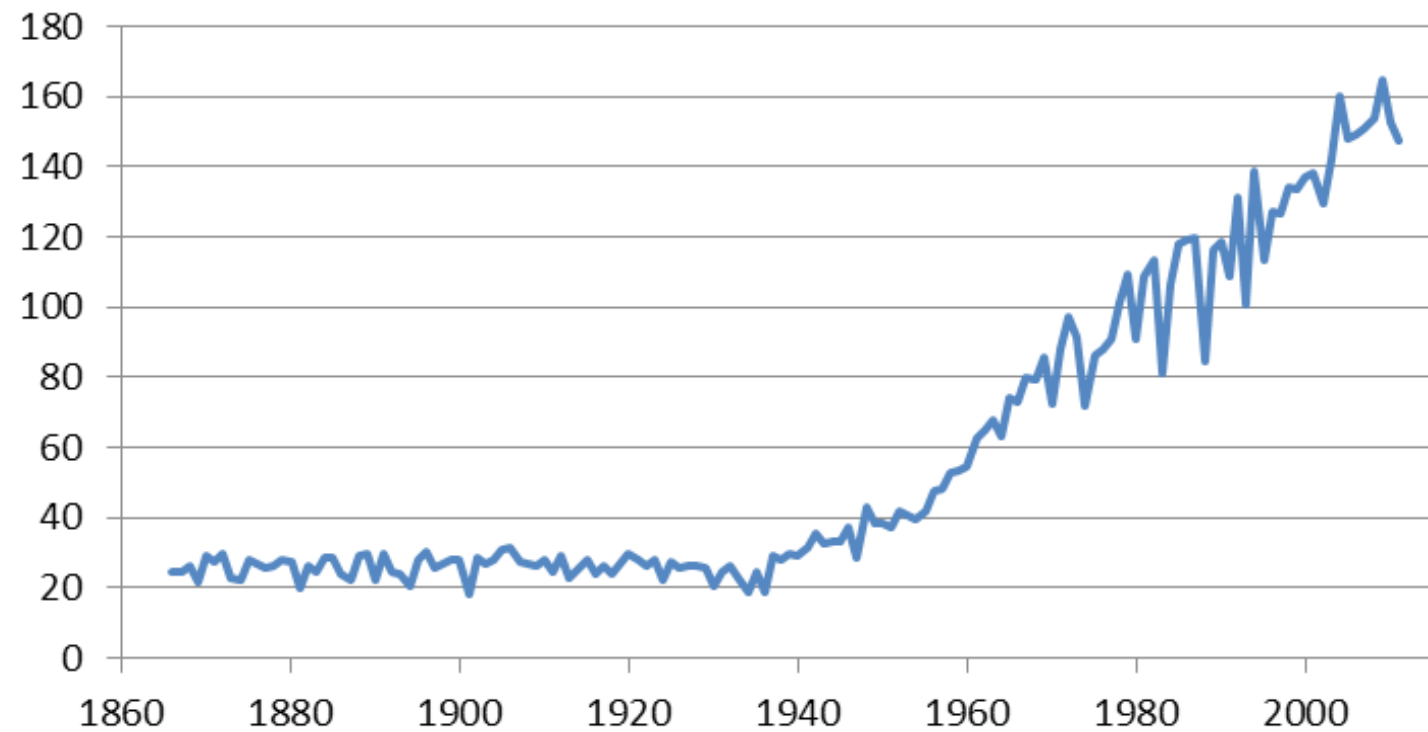
2. Testing your soil so you don't waste precious fertilizer. You might find a zinc (Zn) deficiency and get an extra 25 bushels by adding it to your fertilizer
  3. Increasing your yield--after all, we've broken yield records 16 out of the last 20 years. Average yield back then was 100 bushels of corn per acre. Today, we're on the way to 180 to 200 bushels per acre
  4. Balancing your plant population, fertilizer rate, hybrid, and weed control
  5. Using a starter sidedressing weed and feed, and deep placement to build healthy roots
  6. Lowering energy costs. Reduced-till saves diesel fuel and leaves residue on the surface of the soil, which acts as a blanket to catch water and increase infiltration rate.
- **Programs that save (1986),** 84 slides, 50 minutes.
  - **Herman Warsaw video (1986),** 85 slides, 45 minutes. How Herman Warsaw produced 370 bushels per acre.
  - **Treasures for the Taking (1986),** 3-screen, stereo. It was a story of two pirates, names Barnacle Barney and Salty Sam, who found a map and discovered big treasures at the Nutra-Flo fertilizer plant. They had to do a little farming to get the treasure. All of the newest ideas for growing profitable crops were presented.

The slide programs showed pictures of new, modern equipment. Big sprayers with giant booms could fertilize 80 acres in a single hour without compaction. New modern planter attachments using squeeze pumps could accurately inject fertilizer next to the seed row at planting time. Liquid was delivered by stainless steel transport trucks. Big pumps could unload the fluid fertilizer in a matter of minutes. All the farmer had to lift was the end of a hose.

## Evolution

The late '80s brought about an evolution that began to impact on the slide presentation meetings, signaled by a change that was taking place in farming. When my dad originally started showing presentations at farmer meetings, they were able to

# National Corn Yield



**Figure 1.** The miracle impact fluids have played in five decades of corn yield increase.

get as many as 400 people to attend. They always asked farmers to fill out a small questionnaire telling, among other things, how many acres of corn they farmed. Most of them indicated about 100 acres. But by the late 1980s, the average acres grew rapidly. Most farmers had 500 to 1,000 acres. The reason? Farming equipment improved so that the farmer could cultivate more acres with less labor. The result was that meetings began to get smaller but total farmed acres represented at the meetings increased. Today, 16 farmers can produce five times more grain on the same acres as those 400 attending meetings in the early '60s.

## Transitioning

As we entered the 1990s, consolidation and restructuring affected many organizations. The NFSA was morphing into what is now the Agricultural Retailers Association (ARA). The Fluid Fertilizer Foundation (FFF) had functioned as a part of the NFSA since 1982 but was spun out as a separate not-for-profit research granting institution. My dad became active in its restructuring and ensuring the research and educational focus promoted best practices in using fluid

fertilizers. From the FFF's research findings flows information such as rates per acre, placement, formation, timing, and other beneficial practices that can improve crop yields. The list is long and important to farmers who want to raise profitable crops.

In 1992, my dad also made a trip to visit Ned van Buren who had retired in 1986 as editor of the NFSA's publication SOLUTIONS magazine and moved to North Carolina. He told Ned he had a new publication in mind he wanted to call the Fluid Journal and asked if he would return partially out of retirement to edit it. Dad explained he wanted the magazine to be in full color, with a circulation to all fertilizer dealers and manufacturers in the United States. The objective was to publish research results sponsored by the FFF of the best scientists in the country. Ned agreed, the idea was accepted by the FFF and we were off and running. Today, the Fluid Journal is on the worldwide web and in 2011 recorded more than 80,000 page views by agricultural dealers, manufacturers, farmers, and researchers in over 72 countries. It is regarded as one of the most highly respected sources of

agricultural research available today.

In its own way, the magazine has replaced the farmer meetings my dad held as a way of improving agricultural techniques.

## Salutes

And kudos also need to go to our allies in the miracle: fluid fertilizer manufacturers, chemical companies, and equipment manufacturers who have been a part of the great American agricultural revolution.

**Fertilizer mfg.** After we had proved that our reactions could produce ammonium phosphate, we soon discovered that our costs were too high if we were to compete with other dry fertilizers. A dry fertilizer having an analysis of 16 percent N and 48 percent P (16-48-0) sold for the same price as our 8-24-0. Our liquid grade was just half the analysis at the same price! The free enterprise system reared its ugly head. "How do we compete?," we asked ourselves. We did overcome the problem and our businesses prospered and here's how:

- We developed a process that would use less expensive phosphoric acid instead of the expensive food grade phosphoric acid.

- We developed a continuous, high-volume processing that reduced our costs per ton.
- TVA (Tennessee Valley Authority) scientists developed concentrated super acid. This allowed us to produce grades that contained polyphosphates and allowed zinc and other necessary nutrients to dissolve in the end product—a higher analysis 10-34-0
- We changed our selling program. Dry fertilizer was often broadcast on the surface of the soil. We concentrated on the practices of using fluid "starter" fertilizer. Fluid starter was banded next to the seed at planting time. Since the band was next to the roots, we could obtain the same (or more) yield increase in crops as if 16-48-0 was broadcast on top of the soil! We used this advantage at all of our meetings. The result: our products were competitive!

Because of the above reasons, our businesses mushroomed, grew, and prospered. The ingenuity of free enterprise won again!

**Chemical mfg.** Nor should we overlook nor underestimate the advancements of the chemical companies in producing products that control weeds and insects without harming crops and are environmentally friendly. Weeds and insects have always been the scourge of agriculture. Weeds and insects steal nutrients and water meant for crops. Increased yields from these compounds should not be underestimated.

**Equipment mfg.** Then there are the farm equipment manufacturers that made it possible to change from using the muscles of horses and men to till the soil and harvest crops. Farmers once were required to grow 20 percent more crops just to feed their horses. Because of the breadth of their horses they had to plant corn in 40-inch rows. That meant farmers could only plant about 10 or 12 thousand plants.

With the advent of improved tractors and equipment to turn over prairie soils, prepare the seed beds, and plant in 20- or 30-inch rows, farmers could plant from 25,000 to as much as 40,000

plants per acre. The result: they began harvesting 160 to 250 bushels of corn an acre, compared to about 40 bushels per acre in 1950 (Figure 1).

The biggest difference at harvest time, when corn used to be hand picked, was the arrival of the combines that can harvest as much as 5,000 bushels per hour, compared to 100 bushels per day per man back in the old days!

## Conservation till

Today, the moldboard plow is destined for the grave. We found it oxidizes (destroys) organic matter, and even more important, exposes the soil to erosion from wind and rain. In its place is conservation tillage.

Today, conservation-till has changed the way farmers prepare a seed bed. It uses residue to protect the soil from erosion.

The world of agriculture, truly, is an ever-evolving business. We know not what wonders await us tomorrow. For certain, my dad, with abundant help from many associates (and friends) did much to bring the fluid revolution and its miracles into today's agriculture.

*Dr. Lohry is President of Nutra-Flo Company in Sioux City, IA, and a member of the FFF Board of Directors.*

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