Proposed Backcasting Scenarios for the 2007 Discover Conference on Nutrition and the Environment

Scenario 1a:

Year: 2012

Overview:

a. In late 2007, a two-phase legislation was passed that required all livestock production facilities to reduce N and P excretion by 20% as of 2009, relative to levels recorded in 2007 with additional reductions required by 2012. Also by 2009, a 20% reduction in ammonia emissions was mandated along with a 10% reduction in hydrogen sulfide emissions, and a 10% reduction in dust emissions (Total Suspended Particles).
b. It is now 2012. This first round of reductions (2009 deadline) was accomplished relatively easily. The second phase called for reductions in N and P excretion by 50%, ammonia and NOx emissions by 50%, hydrogen sulfide emissions by 30%, and $PM_{2.5}$ and PM_{10} by 40%. Additionally, beef feedlots and dairy operations were required to reduce methane emissions by 40%. Initially, it appeared as if much of the U.S. livestock production was going to move to foreign countries where environmental regulations were less rigorous. However, with high oil prices making the prospect of importing expensive, and with the possibility of a Global Environmental Protection Act being discussed, livestock production has been maintained and even increased 5-10% across all species. To be in compliance with the new environmental regulations, additional costs were incurred by producers, raising the cost of production by approximately 5%.

How were the 2009 reductions achieved?

What changes in approach were needed to reach the 2012 benchmarks?

What sort of measurements and documentation allows for accurate follow-up on each of the targeted emissions?

Scenario #2

Year: 2017

Mandated reductions in nutrient losses from livestock were phased in over a 5-year period (2007 – 2012). In the following five years (2012-2017), an incentive program was introduced to encourage even greater emissions reductions. This program requires that producers document change starting in year 2012. Baseline emissions were set in 2012 and the goal was for a 5% decrease from baseline yearly, for all species and all regulated emissions (N, P, VOCs, ammonia, hydrogen sulfide, nitrogen oxides, sulfur oxides, methane, $PM_{2.5}$ and PM_{10}), for a total of a 25% decrease vs. baseline on the 5^{th} year (2017).

The incentive program was a success, with more than 50% of producers establishing an effective measurement and documentation program by year 3 (2015) and meeting the 5% annual decrease vs. the 2012 baseline. Compliance increased yearly and by 2017 the incentive program has accomplished an unprecedented level of adoption (80%) that is documentable and verifiable.

The decreases were achieved without greater producer attrition than had been normal prior to the setting of these goals. No loss of productive capacity within any specific region or within the US has been seen.

How were reductions achieved?
What sort of measurements and documentation allows for accurate follow-up on each of the targeted emissions?
What incentives could have resulted in such high adoption?