COMMERCIALIZATION OF CONTROLLED ATMOSPHERES DURING TRANSPORTATION

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The 1980's have witnessed a flurry of international interest by approximately eight companies attempting to commercialize the concepts of controlled atmosphere during the transportation of perishables. Unfortunately, to date and to the knowledge of this author, no company has yet to accomplish this goal and, in fact, some believe that these efforts in the 1980's have even damaged future commercialization attempts. The main damaging aspects have been that greater excitement/expectations were created (sizzle) than what actual operational capabilities were delivered (steak).

From the postharvest physiology/horticulture point of view, there exists ample research results showing the potential benefits of altering various gas levels in the atmosphere surrounding many fruits and vegetables. It has been estimated that about 80% of the major fruit and vegetable species respond favorably to some form of controlled atmosphere. By employing these research results in the transportation phase one can improve the quality of the perishables upon arrival and/or can transport various commodities over longer distances than what is possible using normal refrigerated systems.

While the data exists in most cases regarding how various perishables would respond to controlled atmospheres, can the merchandising ("sizzle") and technological ("steak") problems be overcome? Answers to the following questions are believed to be critical before this concept becomes a reality.

1. Is the system for both trailers and intermodal containers?

2. Is the system going to control nitrogen (oxygen) levels only or are other gases like carbon dioxide, carbon monoxide, and water vapor being considered.

3. If carbon monoxide is to be used, can it be done without infringing on any patent rights?

4. Is the source of nitrogen from liquid nitrogen or will it be from a pressure swing adsorption (PSA) or membrane system?

5. If it is a PSA or membrane system:

   a) What are the power requirements?

   b) How does the environment influence its operation including temperature, altitude, and moisture (sea water)?

   c) Where should it be located (internal vs. external; fixed vs. interchangeable)?

   d) What are the size and weight limitations?

   e) What outputs are required in purity and volume?

   f) What are the compressor limitations?

   g) How will vibrations influence performance?

6. How does the leakage rate of the container/trailer influence the system?

7. How does the refrigeration design influence the system?

8. Will the refrigeration control system be married to the nitrogen system?

9. How are the gas levels going to be controlled (active vs. passive)?

10. How is the very dry nitrogen, regardless of source, going to influence the quality of the products being shipped?

11. How will the products being transported influence the performance of any CA system employed?

12. What is the cost of the unit?

13. How will the unit be maintained?

14. How will theft problems be prevented?

15. What is the return on investment?

16. How will the "demand-pull" atmosphere be created?

These are just some of the questions that will have to be answered before this concept will become a commercial reality. After all, many years passed from the time CA was first researched versus when it became a commercial success: a situation that may have to be repeated.