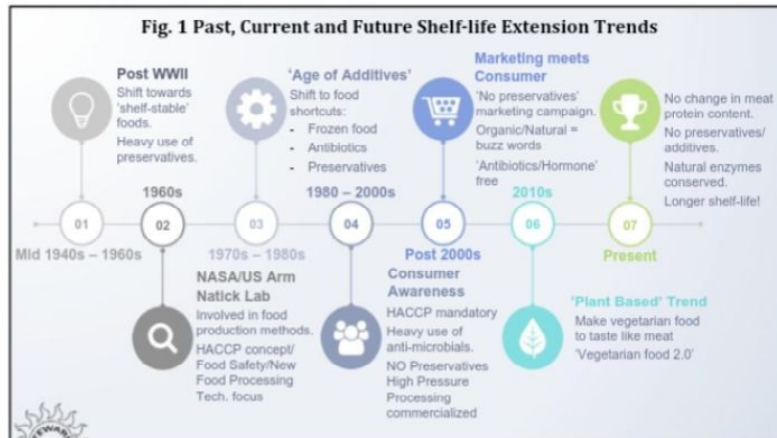


## Re-Think “Modes” of Shelf-Life Extension and “Pre-Pare” for Future?

Food preservation has been a long-lasting desire of human beings from pre-historic era, resulting in focus on different extrinsic factors to alter the “natural” food characteristics, in order to obtain COMMERCIAL SHELF-LIFE, which in turn translates to “BOTTOM-LINE/DOLLAR”. Figure 1 outlines the key-focus areas and “modes” of food preservation for commercial shelf-life since WORLD-WAR II.



### What Got Missed

In quest to achieve long shelf-life and to maximize profits, several not so healthy trends developed since 1940s without understanding the long-term ill-health effects on humans, [Figure 1]. Even post 2000, we continue to see exceptions/short-cuts pushed by the meat & poultry industry without understanding the long-term health-effects, for example, FDA giving GRAS [Generally recognized as safe] to use Carbon Monoxide for case-ready meats to give “color” and Health Canada allowing use of processing aids [high levels of Peracetic Acid [PAA] for poultry] without understanding the residual levels effect on human-health, and leaving it to the processor for validation? Historically, a lot of interventions, which had regulatory approval ended up having a long-term ill-effect of human health, for example, human became resistance to antibiotics and several human allergies started to develop, and till to-date, we struggle to find the EXACT SCIENCE behind all this. Any extrinsic factor, providing commercial shelf-life, ends up changing the NATURAL INTRINSIC properties of protein, and hence, we see move towards: ORGANIC FOODS, RAISED WITHOUT ANTIBIOTICS, HORMONE-FREE, WHOLE, NATURAL, FRESH, HOME-COOK, etc. Consumer-awareness has increased tremendously, and the processors/industry is left with no choice but to adapt to the reality that “whatever was selling yesterday will become a thing of the past”. FYI: 70% of antibiotics produced by pharmaceutical companies are for non-

human use. Regulatory bodies have also started to understand its mistakes, and several key changes have happened in the last few years, such as, CANADIAN FOOD INSPECTION AGENCY/CFIA banning use of Carbon Monoxide for meats, and this trend got followed by several regulatory bodies in Europe and Middle-East, and in Asia; Use of Anti-biotics [level 1] is prohibited for poultry; Health Canada asking processors to examine the residual levels of processing aids in the end-product, just to quote a few examples.

The following trends shall affect the “modes”, by which the shelf-life shall be obtained during current and future times:

**1. Alternate proteins trends:** In the past decade, we have seen how food has been reimagined by embedding vegetarian food with proteins that originally helped make meat stand apart. While it is still vegetarian food, the era of ‘plant-based meat’ has saturated the media as its goal is to reduce meat production, and thus, minimize the protein industry’s environmental impact. Upon closer inspection, we realize that plant-based foods rely upon a single protein – heme. In other words, heme is responsible for the past decade’s ‘new food’ craze, and further applications of proteins that we may have taken for granted, or may not have known existed, are crucial for the advancement of the global protein industry. The long-term goal of ‘alternative proteins’ is indeed admirable, which is can we produce high quality food with a lower

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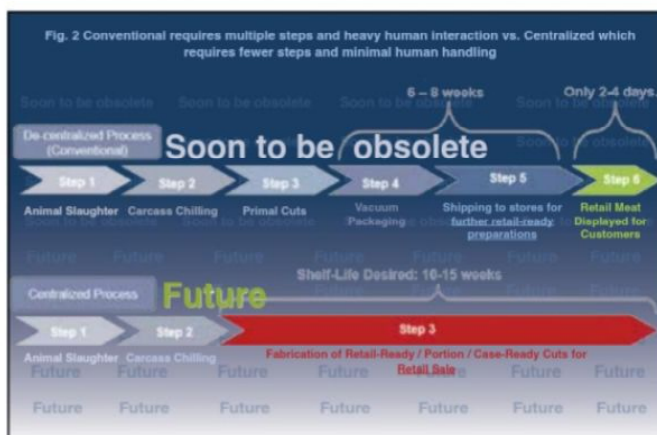
Continued from page 6 – RE-THINK “MODES” OF SHELF-LIFE EXTENSION AND “PRE-PARE” FOR FUTURE?

environmental impact? The answer is yes, but we must besiege the problem on all fronts, and that is only possible if every member of the protein industry can reimagine how proteins are produced, used, and consumed. The mastery of heme production spurred the popularity of ‘vegetarian food 2.0’, but can we master other proteins to optimize conventional production systems for pork, beef, poultry, etc.? Can we master proteins to increase shelf-life, eradicate the use of preservatives, and invent new categories of food while still maintaining the highest quality of safety? The short answer is yes, but we must invest on researching proteins that are underappreciated or underutilized and embrace the few out there who already have the answer. Preserving natural enzymes within the proteins is the only way to compete with the ‘alternate protein industry’.

**2. Pandemic effects:** Due to current pandemic, labour-intensive food manufacturing, especially, meat & poultry, shall be hurt long-term due non-understanding of human-human, human-animal/bird, animal/bird-animal/bird, animal/bird-human transfer of virus/infection. Although some robotics has been introduced in the downstream processing/handling in meat/poultry operations, still meat & poultry is very labour-intensive, and the pandemic shall have a long-term effect for years for the meat & poultry operations. This is high time to utilize the resources to its absolute maximum, i.e., maximize labour, minimize handling, excellent inventory

control/management of inventory at all levels of supply-chain, and above all, maximize the shelf-life of currently produced fresh meat/poultry and minimally processed meats/poultry, and utilize processes that provides longest possible extension while retaining the natural intrinsic properties. The future protein operation is outlined in Figure 2, and need immediate “paradigm-shift” for the industry to go towards an operation minimizing human handling or human handling, especially to guard any set-back for current and future pandemics without compromising human/animal health and delivering safe-food with longest possible shelf-life. ■

Dr. Tewari, MS & PHD  
Tewari Group  
1-844-493-7669  
www.tewarisystemsglobal.com



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2. Ranchers Lamb [San Angelo, TX, USA]
3. Mountain States Rosen Lamb [Bronx, NY, USA]
4. Tyson Foods [Springdale, AR, USA]
5. UGASA [Mexico]
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7. Riz Global Foods Inc. [Canada]

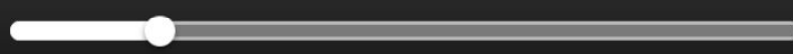
Contact:  
Tewari De-Ox Systems, Inc.  
8025 Leslie Street, Suite 201  
Richmond Hill, ONTARIO L4B 3H6 CANADA  
Phone: 1-844-493-ZERO-OX • Fax: 1-844-493-7669  
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Protein-type	Shelf-life	Tewari's Zero-OxTech®
Red meat [beef, pork, lamb]	Storage/Distribution	76 to 105 days
	Retail Display	5 to 7 days
	Meat color	Red
Poultry	Storage/Distribution	63 to 65 days
	Retail Display	19 days

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