Challenges and Way Forward
in Dairy Engineering Research and Education

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Purpose: Research for <u>Income Centric</u> Dairy farming and processing, and <u>not production Centric</u>

As topic indicates presentation is in two parts

1. Research Challenges and future need

2. Dairy Engineering Education Challenges

and both sub-topics will touch upon distinctly in two parts

    (a) Dairy production and

    (b) Dairy processing

Dairy Production Mechanization

Dairy Farming (Milk production) - Maximizing output per unit input (What is the average cost of milk production??)

Animal Feed – Safe Raw feed, primary processed, high value (optimization of feed input for maximizing milk production and minimizing health problems and stress of an animal

Animal Housing - Animal comforts, environment management (macro level), clothing (micro level), animal handling and transport during sickness

Animal Tracking: Whereabouts', RFID, health information system, happiness index (hungriness, thirstiness, health status etc using sensors and IoT

Quality milk harvest: Time of milking, hygiene, mechanical milking, pesticide/insecticide residue, contamination, adulteration, milking container, temperature controlled container/cold chain)

Saving the harvests: from contamination during milking, handling, transport, and processing, milk spoilage (0.92 % loss ≈ 15 MMT ≈ Rs. 3000crore & Rs. 20/- per kg)

Real Challenge is to keep milk production ever-increasing according to demand

How will do that? How will it continue for ever-increasing population

We have to design a cow/buffalo/goat as a machine, which can produce milk upon pressing a button or group of buttons and milk produced by the machine may be called as **Engineered Milk**

It may involve design of input system, digester/intestinal system etc. of animal

Dairy processing Automation

- **Mechanization of the Traditional product**

- **Table top sweet/paneer making machines**

- **Minimization of water use in urban dairy and maximization of sanitary conditions in a rural dairy**

- **Minimization of energy consumption and maximizing output/input ratio**

- Design of **Zero budget dairy** by utilizing dairy waste/byproducts

- **High value low volume products** from high volume low value byproducts

- **Fit and Eat packaging** materials (Eatable cutleries/package from dairy byproducts)

- **Nondestructive *in-situ* quality, safety** and self life prediction system

- Design of **quality based pricing system**

Educational Challenges

Issues which hunt me the most are:

1. **Quality of manpower particularly graduates and postgraduates produced and employed**

   ➤ Design of course curriculum

   ➤ Attracting best talent, downing eligibility for admission

   ➤ Lack of qualified (in real sense) teachers

   ➤ Inbreeding of teachers and setting between teachers & examiners

   ➤ Lack of standard facilities (even if acquired not able to maintain)

   ➤ Uniformity in quality standards throughout India

   ➤ Lack of business incubation centre

   ➤ Under-employment even for low number of graduates/ postgraduates

2. Policy Issues

(a) Examination systems (Semester, Deemed university)

(b) Implementation of ICAR model code

(c) Appointment and promotion system of teachers

(d) Huge number of vacant posts

(e) Funding based on ranking/accreditation

(f) Autonomy to the university/individual scientists/faculty

3. Other factors

(a) Lack of devotion and feeling responsibility

(b) Too much monitoring and reporting

(c) Lack of trust/loyalty

(d) Lack of congenial working atmosphere

(e) Leaders/managers at top position

(f) Collaboration between research/teaching institutes and industries

What I see, draught for out of box idea, either for products or machineries

Thank you