



LET US UPGRADE OUR STATUS AS GLOBALLY COMPETITIVE MILK EXPORTING NATION

We as dairy professionals feel proud to claim that our motherland is resource rich No. 1 milk producing country. During the present era of cut throat global competition need of the hour for us is to carryout in depth S.W.O.T analysis of emerging threats and professional weaknesses coming in our way as hurdles in upgrading our status as leading milk exporting nation.

UNRESOLVED CORE ISSUE AND COMPLEX PROBLEM

Age old major unresolved problem of dairy business entrepreneurs in our country is that we do not have any instrument or technique to analyse true net worth of mixed milk (B.M. + C.M. + added water) actually being received in our dairy plants and its cross examination and comparison with total milk payment being claimed, using prevalent conventional milk billing system and software solution.

True worth of raw mixed milk can only be worked out with digital analytical technique (D.A.T.) and gravimetrically determining exact percentage of buffalo milk, cow milk and added water in mixed milk actually being received on dairy dock.

Primary prerequisite, therefore, for achieving our common cherished goal is to provide required technical knowhow to every dairy plant for procuring only 100% pure raw milk strictly conforming to international quality standards. We can do so only by discarding prevalent/obsolete milk procurement and payment system of purchasing diluted/manipulated raw milk containing 20 to 30% added water that not only spoils the quality of raw milk but also leads to corruption in the system. Unethical middlemen in the milk procurement value chain have devised perfect ways of converting added water as additional cow milk by manipulating natural S.N.F.: Fat ratio in milk billing records thus causing hidden loss of billons of rupees to dairy institution in India.

In order to attain required global competitive edge in terms of quality, we have no option but to ensure that every dairy plant in India purchases only 100% pure raw milk (B.M. or C. M.) for producing pasteurised milk and value added dairy products strictly conforming to international quality specifications relating to purity of contents, microbiological safety and shelf life.

Buffaloes and cows of our country are truly trust worthy because they can neither dilute their own milk with added water, manipulate the natural S.N.F: Fat ratio or intentionally increase/decrease total milk solids in the divine nectar (milk) produced by them.

Decades ago legendary dairy professional expert devised a simple arithmetically accurate and scientifically logical 60:40 two axis formulae for purchasing pure raw buffalo or cow milk on

commercial scale and releasing milk payments to producers/suppliers depending on total milk solids, Fat and S.N.F. content (gravimetrically not volumetrically) in the liquid milk of two categories.

Formula evolved by him is based on benchmarking standard buffalo milk containing 6.50% Fat, 8.84% S.N.F. and 15.34% total milk solids that gravimetrically corresponds to 29.00 corrected lactometer reading (C.L.R.) . S.N.F. of buffalo milk can be calculated with accuracy up to decimal points as follows:

$$\text{S.N.F.} = \text{C.L.R.}/4 + 0.2 \times \text{Fat} + \text{C.L.R.}/100$$

$$\text{Cross check verification: S.N.F.} = 29/4 + 0.2 \times 6.50 + 29/100 = 8.84\% \text{ (S.N.F: Fat ratio } 8.84/6.50 = 1.36)$$

International standard gravimetric bench mark composition of cow milk is 3.50% Fat. 8.50% S.N.F. 12.00% milk solids that correspond to 30 corrected lactometer reading (C.L.R.)

$$\text{Cross check verification: S.N.F.} = 30/4 + 0.2 \times 3.50 + 30/100 = 8.50\%$$

$$\text{(S.N.F: Fat ratio } 8.50/3.50 = 2.4285714)$$

This formula is accurate for both axis (buffalo milk as one axis and cow milk as another axis) provided it is 100% pure raw milk without any dilution with added water, manipulation of natural S.N.F.: Fat ratio or adulteration.

Basic difference between cow milk and buffalo milk is in their natural S.N.F.: Fat ratio and total milk solids (12% in standard cow milk as compared to 15.34% in case of standard buffalo whole milk).

Let us assume that bench mark price for standard buffalo milk declared by commercial/cooperative dairy plants is Rs. 700/Kg fat.

Due milk payment for 100 Kg standard buffalo milk containing 6.50% Fat ,8.84% S.N.F and 15.34% total milk solids corresponding to 29 C.L.R. would be Rs. $6.50 \times 700 = \text{Rs. } 4550$ or Rs 45.50 per Kg.

By dividing total amount of payment i.e.Rs.4550 in 60:40 ratio

$$\text{Fat value would be Rs. } (4550 \times 0.60 / 6.50) = \text{Rs } 420/\text{Kg Fat}$$

$$\text{S.N.F. value would be Rs. } (4550 \times 0.40 / 8.84) = \text{Rs } 205.88235/\text{Kg S.N.F.}$$

Irrespective of any variation in composition of raw milk value of Fat/Kg and S.N.F/Kg (on dry matter basis) would remain the same as mentioned above.

Similarly due milk payment for 100 Kg standard cow milk containing 3.50% Fat, 8.50% S.N.F and 12.00% total milk solids corresponding to 30 C.L.R. would work out as under:

$$\text{Rs. } (3.50 \times 420 + 8.50 \times 205.88235) = \text{Rs. } (1470 + 1749.4997) = \text{Rs } 3219.9999 \text{ or Rs. } 32.20/\text{Kg.}$$

Hidden loss to purchaser due to manipulation in S.N.F. Fat ratio and dilution with added water

We all know that specific gravity of water is 1.0 so 100 litres of water would weigh 100 Kg.

Fat is lighter than water but S.N.F. is heavier than water so density / specific gravity of these two components of milk is diametrically opposite to each other.

(A) Let us assume that we have 100 Kg pure buffalo milk of standard bench mark composition mentioned above and we add 3.34 Kg milk solids of B.M. in this milk thus increasing the concentration of milk solids from 15.34% to 18.68% so that its weight becomes 103.34 Kg. With increase in total milk solids Fat content of milk would become 7.9152541Kg. S.N.F. becomes 10.764745 Kg. and corresponding C.L.R. of Milk would be 35.31421 (As per digital hydro analysis technique)

Cross check by 60:40 two axis formulae:

$$S.N.F = 35.31421 / 4 + 0.2 \times 7.9152541 + 35.31421 / 100$$

$$= 8.8285525 + 1.5830508 + 0.35.31421 = 10.764745\%$$

$$\text{Net worth of milk} = 7.9152541 \times 700 = \text{Rs.} 55.406778 / \text{Kg}$$

$$\text{Increase in net worth} = \text{Rs } 55.406778 - 45.50 = \text{Rs } 9.906778 / \text{Kg}$$

In fact to increase the worth of standard buffalo milk to Rs.55.406745 /Kg we will have to add 21.77313 KG. Liquid buffalo milk of standard composition so that it's C.L.R. becomes 35.31421

(B) Let us assume that we have 100 Kg pure buffalo milk of standard bench mark composition mentioned above and we take out 3.34 Kg milk solids of B.M. from milk of this composition thus decreasing the concentration of milk solids from 15.34 Kg. 12.00 kG. so that its weight becomes 96.66 Kg. With reduction in total milk solids Fat content of milk would become 5.08474 Kg., S.N.F 6.91525 Kg. and corresponding C.L.R. of milk would be 22.688578 (As per digital hydro analysis technique)

Cross check by 60:40 two axis formulae:

$$S.N.F = 22.688578 / 4 + 0.2 \times 5.08474 + 22.6885786 / 100$$

$$= 5.671445 + 1.016948 + 0.226885786 = 6.9152787\%$$

$$\text{Net worth of milk} = 5.0847452 \times 700 = \text{Rs.} 35.59322 / \text{Kg}$$

$$\text{Decrease in net worth} = \text{Rs } 45.50 - 35.59322 = \text{Rs } 9.90678 / \text{Kg}$$

In fact to reduce the net worth of standard buffalo milk to Rs. 35.593216 /Kg we will have to add 27.83333 Kgs. water as diluent so that its C.L.R. proportionately gets reduced from 29 to 22.6885786

(A) Let us assume that we have 100 Kg pure cow milk of standard bench mark composition mentioned above and we add 3.34 Kg milk solids of C.M. in this milk thus increasing the concentration of milk solids from 12.00 Kg. to 15.34 Kg. so that its weight becomes 103.34 Kg. Due to increase in total milk solids Fat content of milk would become 4.4741665 Kg., S.N.F. becomes 10.865832 Kg. and corresponding C.L.R. of Milk would be 38.349999 (As per digital hydro analysis technique)

Cross check by 60:40 two axis formulae:

$$S.N.F = 38.349999 / 4 + 0.2 \times 4.4741665 + 38.349999 / 100$$

$$= 9.5874997+0.8948333+ 0.38349999 =10.865832\%$$

$$\text{Net worth of milk} = (127.833333 \times 32.20) / 100 = \text{Rs.} 41.162332 / \text{Kg}$$

$$\text{Increase in net worth} = \text{Rs } 41.162332 - 32.20 = \text{Rs } 8.962332 / \text{Kg}$$

In fact to increase the worth of standard cow milk to Rs.41.162332 /Kg we will have to add 27.83333 KG. liquid cow milk of standard composition so that its C.L.R. becomes 38.349999

(B) Let us assume that we have 100 Kg pure cow milk of standard bench mark composition mentioned above and we take out 3.34 Kg milk solids of C.M. from milk of this composition thus decreasing the concentration of milk solids from 12 Kg. to 8.66 Kgs. So its weight becomes 96.66 Kg. With reduction in total milk solids Fat content of milk would become 2.5258331Kg. , S.N.F. 6.134166 Kg. and corresponding C.L.R. of milk would be 21.649998 (As per digital hydro analysis technique)

Cross check by 60:40 two axis formulae:

$$\text{S.N.F} = 21.649998 / 4 + 0.2 \times 2.5258331 + 21.649998 / 100$$

$$= 5.4124995 + 0.5051666 + .21649998 = 6.134366$$

$$\text{Net worth of milk} = 72.16666 \times 32.20 = \text{Rs.} 23.237664 / \text{Kg}$$

$$\text{Decrease in net worth} = \text{Rs } 32.20 - 23.237664 = \text{Rs } 8.962336 / \text{Kg}$$

In fact to reduce the net worth of standard buffalo milk to Rs. 23.23766 /Kg we will have to add 38.56812 Kg. water as diluent so in that case its C.L.R. would be reduced to 21.649998

Only the Institutions like AM.U.L. purchasing raw milk from actual milk producers following genuine "ANAND PATTERN" principles chartered by revered legendary Dr. V.Kurien and accurate testing of raw milk for added water or adulteration for each and every milk purchase transaction from milk producer to dairy plant can face emerging cut throat global competition by successfully procuring 100% pure raw milk conforming to international quality and successfully export value added dairy products in the global market.

All other dairy plants unfortunately purchasing diluted raw mixed milk (B.M+ C.M. + added water) without knowing exact % of B.M., C.M. and added water in mixed raw milk, would keep on producing sub-standard processed milk and dairy products besides suffering hidden loss (about 20% cost of raw milk). We all know that added water used for dilution/manipulation in raw milk purchase transactions is neither R.O. or reputed brand mineral water because mineral water is selling at the rates much higher than price of cow milk actually reaching the milk producers in our country. Not many of us know that about 600 litres water is required to produce one litre of divine nectar called milk.

Digital hydro analysis technique is the only method to find out true worth of raw mixed milk actually reaching our dairy plants. New regulatory standards recently prescribed for buffalo milk in India by F.S.S.A.I (applicable with effect from February 2022) are 5.00% Fat and 9.00% S.N.F. These standards would be grossly misused by unethical middlemen now dominating the milk procurement value

chain, resulting in further increase of added water in mixed milk and abnormally high hidden loss to ethical dairy business entrepreneurs in milk purchase transactions.

If we carry out actual milking operation of more than 100 buffaloes in milk (freshly calved + late lactation) in a commercial dairy farm In India, average Fat % is not going to be less than 6.50% and corrected lactometer reading (C.L.R.) of that mixed milk would never be less than 29. Corresponding to 29 C.L.R., S.N.F: Fat ratio of natural pure buffalo milk without added water would be 1.36 (8.84/6.50=1.36). 60:40 two axis formulae used for fixing benchmark price of buffalo milk in India is designed on the basis of this ratio and specific gravity of fat content and S.N.F. content in pure raw buffalo whole milk.

$$\text{S.N.F} = 29/4 + 0.2 \times 6.50 + 29/100 = 8.84\%$$

$$\text{(Total milk solids of undiluted pure buffalo milk} = (6.50 + 8.84) = 15.34\%$$

Now if we lower the standard of buffalo milk from 15.34 % total milk solids to 14% total milk solids then manipulators would take out about 9 kg milk out of buffalo whole milk and add about same quantity of added water in that milk .They will modify/manipulate S.N.F.: Fat ratio of mixed milk in milk billing transaction records in such a way that added water gets converted as additional cow milk in the mixed milk. Manipulation by dilution cannot be detected with conventional software (without hydro analysis of mixed milk reaching on our dairy dock) being used by one and all in India for evaluating mixed milk and releasing milk payments to suppliers.

If Mixed milk reaching dairy plants is 100% B.M. containing 5.00% fat, then its C.L.R would be 22.30769 and calculated S.N.F. = $22.30769/4 + 0.2 \times 5.00 + 22.30769/100 = 6.80\%$ (11.80% Total milk solids) (88.2% water content as compared with natural 84.66% in the benchmark whole milk)

If mixed milk reaching dairy plant is 100% Cow milk containing 5.00% fat then calculated C.L.R. of that milk should be 42.857142.

Corresponding S.N.F = $42.857142/4 + 0.2 \times 5.00 + 42.857142/100 = 12.142857$ (82.85715% water content as compared with 88% natural water in standard cow milk containing 3.50% fat, 8.50% S.N.F. and 12% total milk solids corresponding to 30 C.L.R.)

If mixed milk reaching dairy plant is 86.95651% of mixed milk (25% Cow milk+75% buffalo milk) its fat content would be 5.00% fat and 7.613043% S.N.F ,12.613043% Total milk solids corresponding to 25.434779 C.L.R.)

$$\text{S.N.F.} = (25.434779 /4 + 0.2 \times 5.00 + 25.434779 /100) = 7.6130424\%$$

If mixed milk reaching dairy plant is 50% Cow milk+50% Buffalo milk then its fat content would be 5.00% fat and 8.67% S.N.F and 13.67% Total milk solids corresponding to 29.50 C.L.R.) S.N.F.= $(29.50/0.2 \times 5.00 + 29.5/100) = 8.67\%$

If mixed milk reaching dairy plant is 117.64705% of mixed milk (75% Cow milk+25% buffalo milk) its fat content would be 5.00% fat, 10 10% S.N.F and 15.10% total milk solids corresponding to 35 C.L.R.)

$$\text{S.N.F} = 35 /4 + 0.2 \times 5.00 + 35 /100 = 10.10\%$$

Manipulated mixed milk containing 14% milk solids could be either whole buffalo milk out of which either 1.5% fat has been extracted and 0.06% S.N.F has been added or 100 Kg diluted buffalo milk containing 5.9232199% Fat+8.05579% S.N.F. and 14% total milk solids , corresponding to 26.426673 C.L.R., 100 Kg concentrated cow milk containing 3.9083331%Fat+ 10.091667% S.N.F. and 14% total milk solids corresponding to 35 C.L.R. or 5.120702% Fat +8.872972% S.N.F. and 14% total milk solids (50% Cow milk +50% buffalo milk) corresponding to 30.21141 C.L.R.. True monetary worth of such manipulated permutations and combinations of milk would not be the same and cause hidden loss to purchaser that cannot be assessed without digital hydro analysis of raw milk.

As per deep research and actual case studies based on digital hydro analysis of milk purchase transactions of cooperative/commercial dairy plants in India (conducted by our Mission associate) we find absolute majority of dairy plants are purchasing diluted /manipulated raw milk unsuitable for producing pasteurized milk /dairy products strictly conforming to international quality specifications relating to purity of contents, microbiological safety or shelf life.

Let us admit that we do not have any instrument or technique to find out exact % of cow milk, buffalo milk or added water in mixed milk actually reaching our dairy plants and evolve arithmetically accurate and scientifically solution for this complex problem.

Actual case study of premier dairy institution in north India conducted recently by us indicate hidden loss of nearly Rs 500 crores annually to that organisation due to dilution of raw milk with added water and manipulation of S.N.F. : Fat ratio in milk purchase transaction records (Assuming no adulteration except added water). We can well imagine that total amount of loss on this account to all such dairy institutions in India/south Asian countries purchasing mixed milk (B.M+C.M) with conventional system and software solution would become an astronomical figure.

Our Mission has submitted detailed hydro analysis report regarding hidden loss to that organisation offering complimentary prize of Rs. One lac to any professional executive of their dairy plants who proves our claim and contentions related to these losses as arithmetically incorrect or scientifically not logical as per prevalent 60:40 two axis formulae and software calculations being used for releasing milk payments. (No one has claimed this prize so far)

ARITHMETICALLY ACCURATE & SCIENTIFICALLY LOGICAL SOLUTION OF COMPLEX PROBLEM:

Highlighting the problem without offering arithmetically accurate and scientifically logical solution supported with live demonstration under prevailing field conditions would serve no useful purpose and become a futile exercise. Our Mission associates have evolved easy to implement fool proof "APNI DAIRY" milk procurement and business management system for procuring 100% pure raw milk meeting with international quality parameters. Authentic documentary/video evidence in support of our claims and contentions mentioned herein in this presentation is available on our website apnidairy.com

Dairy plants interested in purchasing 100% pure raw milk meeting with international quality standards may implement our suggested 'APNI DAIRY" milk procurement system for attaining required global competitiveness. All that they will need is to issue following instructions to their milk procurement staff for ensuring strict implementation (without any exception). They will not only be able procure 100% pure raw milk meeting international quality with the help of these management

interventions but also be in a position to increase specified B.M. bench mark milk procurement rates by more than Rs.100/Kg. Fat without any negative impact on their bottom line financial performance results.

SIMPLE EASY TO IMPLEMENT SCIENTIFICALLY LOGICAL INSTRUCTIONS:

1. Conduct K.Y.M.P. survey (know your milk producer) in every village in the milk-shed operational area to know number of dairy animals(cows and buffaloes) kept by each milk producer, average milk production and committed quantity of surplus milk/day likely to be supplied to your organisation. (Only milk supplied by milk producers registered by the organisation after due verification should be accepted by milk collector/secretary of co-operative society)
2. Milk procurement staff must provide live demonstration to every dairy farmer supplying buffalo milk that average herd average Fat % of buffalo milk would always be in the range of 6.50% to 7.50% and C.L.R not less than 29. However if fat % of any freshly calved individual animal is less than 6.50 % corresponding C.L.R. would be more than 29. Similarly if fat % of any late lactation animal is more than 7.50% even then C.L.R. of that milk would not be less than 29. Milk collector /secretary of milk society would only use weighing machine and testing apparatus strictly calibrated with N.P.L. instruments /Govt. approved weights and measures department.

Only buffalo milk containing fat % more than 6.50 and C.L.R. more than 29.00 would be accepted by milk collector (For each milk purchase transaction). Due milk payment after actual weight measurement and FAT/S.N.F. testing would be recorded on the pass book of milk producer immediately after completing milk purchase transaction. If C.L.R. of milk is more than 29.00 and corresponding calculated S.N.F. Is more than 8.84% payment for additional extra S.N.F. would also be payable as per S.N.F. rate.

3. Milk procurement staff must provide live demonstration to every dairy farmer supplying cow milk that normally average herd average Fat % of cow milk would always be in the range of 3.50 to 4.50% and C.L.R not less than 30. However if fat % of any freshly calved or high yielder individual animal is less than 3.50 % corresponding C.L.R. would be more than 30. Similarly if fat % of any late lactation or desi cow is more than 4.50% even then C.L.R. of that milk would not be less than 30. Milk collector /secretary of milk society would only use weighing machine and testing apparatus strictly calibrated with N.P.L. instruments /Govt. approved weights and measures department.

Only cow milk containing fat % more than 3.50 and C.L.R. more than 30 would be accepted by milk collector (For each milk purchase transaction). Due milk payment after actual weight measurement and FAT/S.N.F. testing would be recorded on the pass book of milk producer immediately after completing milk purchase transaction. If C.L.R. of milk is more than 30.00 but corresponding calculated S.N.F. Is more than 8.50% payment for additional extra S.N.F. would also be payable as per S.N.F. rate.

4. Milk collector after completing milk collection morning and evening would calculate net worth of total milk solids (fat Kg & S.N.F. Kg.) available at his collection centre. While handing over milk to tanker driver/tester of milk transporter he will record total value in (Rs.) in terms of Fat Kg. & S.N.F. Kg. and receive acknowledgement from the transporter. Any shortage or loss in terms of value of

milk solids (Fat Kg & S.N.F. Kg.) during the period milk remains in transit would be recoverable from the transporter.

Composite sealed sample of milk received by transporter from each milk collector would be also put in the locked container box (available with road milk tanker) for counter checking by quality control laboratory of dairy plant for any adulteration or inaccuracy in tests conducted by milk collectors.

5. Milk when received at dairy plant should be weighed accurately and tested for its net worth in monetary terms based on total milk solids (Fat Kg. & S.N.F.kg.) Loss due to Manipulation, Adulteration or Dilution (M.A.D.) if any should be recovered from the defaulters (milk collectors, transporters and concerned milk procurement staff).

Mission Director

International Improvement Mission

- Presentation is being shared by international Improvement Mission to safeguard the interests of needy milk producers, health conscious consumers and ethical dairy business entrepreneurs.
- Feedback and professional comments on this presentation received by us on our email address iiuhumber@gmail.com would be highly appreciated and gratefully acknowledged.

<https://www.linkedin.com/pulse/let-us-upgrade-our-status-globally-competitive-milk-jaswant-singh/?trackingId=zac7ax%2F23yczP7H3s59eVQ%3D%3D>