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Modern Animal Husbandry Practices and Animal Welfare Requirements

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Farming community is under continuous pressure to feed more people with less resources as human population is increasing day by day. India is number one world human population surpassing China (As per UN population estimates). Technology the need of the hour refers to our immense obligation in modern era. Modern animal husbandry practices include use of modern technologies, facilities and equipments which together translate into production and also welfare of animals. Benefit of modern animal husbandry practices to farmers are improvement in yield such as milk meat and eggs. In same line adoption of scientific and modern method of animal husbandry helps to increase the farmers income as well as to protect the farms, need for food, feed, fodder and fuels etc. It helps the farmers in proper management of animals like providing them proper food, good quality water, shelter, protection and against diseases and arrangement of comfort during stress especially during stressful physiological events like parturition and transition phase. It includes modern facilities, precise livestock production and intensive and high stocking densities. At the same time, it provides animals with minimal living conditions i.e., welfare regulations. This in turn should guarantee a good quality of livestock materials and products. Livestock welfare is well established facts which emphasizes on providing basic needs to the animals like feeds, water, space, equipments, hygienic and proper living conditions. Neglect of welfare issue is common problems in Indian condition especially to the farmers door step. We must ensure use of technology in accordance with the physiological requirements of animals along with

keeping animals happy, healthy and comfortable. As peoples are willing to pay more for products from animals maintained under good welfare status.

Use of computer automation and software: As a part of modern animal husbandry practices and data recording smart system provide opportunities to the farmers with respect to decision making by reducing human error. Common practices using technologies in animal husbandry include *electronic identification* system of animals, milking automation, feeding automations, health observation, reproductive performances, barn environmental control etc. RFID biometric sensors, GPS systems allows monitoring of farm animals. Controlled traffic farming (CTF) gives soil the chance to regenerate and increase yield @ 10%. Even drones can be used for monitoring livestock production especially for farming community of hill area. This technology could be used to locate and identify particular animals and track grazing pattern. In our digital age we are handling vast amount of data, many sensors are used in appliances, packages. Internet of things (IoT) is one of the new technologies being use to raise livestock. IoT used to connect physical world with digital world in order to understand environment. It is also used to predict future events. IoT empowers managers with information and alert them for interventions. Mobile sensors are used to track the health of animals and increase the productivity. Moocall Irish technology claim to reduce the mortality by 80%. Artificial intelligence (AI) and machine learning also tried in raising livestock. Computer algorithms puts insight into business metrics and improving data-based decision making. Agbots (Agriculture robots) associated with automation of tedious agrarian system. *Automatic milking system* using robotics can milk cow within a short time using sensor controlled mechanical arm along with measurement of feed consumed during milking in parlour. Automatic milking system give many information about milk production, milking speed, acidity, conductivity, sensors are also added to know progesterone level and milk temperature. Reliability of data further improved by identification system with RFID. Artificial intelligence can successfully track age, milk quality or health status of animals. *Block chain technology* provide livestock industry the most operating management system help to control and audit at one place. Block chain is ledger which records transactions and proof the same in revision. Animal products and ingredients are traceable at each stage of supply chain, which makes process of raising livestock completely transparent in other words block chain for livestock simplify agriculture and livestock management. Feed intake can be assessed using sensor along with rumen pH, rumen temperature using rumen bolus which work for 100 days and data stored for every 15 minutes for future evaluation. Sensors are also available to note cow's jaw movement/

rumination to associate it with health of cow. Early detection of disease is also important to reduce treatment costs, reduce mortality and improve production efficiency. Change in behaviour of animals is also detected by sensors helpful in controlling health problems.

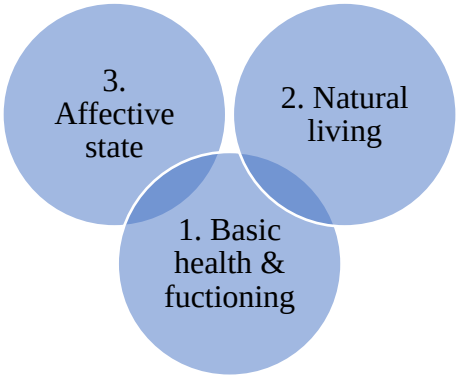
Welfare status: Five freedoms are internationally documented as golden standard in animal welfare, encompassing both physical and mental wellbeing. Five freedoms include freedom from hunger and thirst, freedom from discomfort, freedom from pain injury and diseases and freedom to express normal and natural behaviour. The same is under prevention of cruelty to animals' act-1960. Which prevent from the infliction of unnecessary pain or suffering on animals. Similarly, an advisory body named Animal welfare board of India established in India in Year 1962 which formulates laws and promote animal welfare in country. Welfare of animal can be quantified using standard welfare scoring system also. Welfare of farm animals with health, food quality, ethical approach to animals and protection of environment and climate is key to modern production system. Accordingly we need to shift from production to social and consumer related concern effective for transforming current animal production into higher livestock welfare standards.

In order to improve the efficiency of animal production led to the introduction of intensive technologies related to a large concentration of animals in a single place, hence the facilities that were built served more to human being rather animals. Said system affect behaviour of animals including its physiology and end product. It is frequently reported that status of welfare in animal decreases with increase in intensification of production system. Behaviour expresses wellbeing along with environmental conditions therefore it is *sign language* of animals. In *chain store* system product should be marked as produced with a technology marked by high level of animal welfare.

Improvement in breeding value of animals should be emphasized followed by improvement in welfare of animals through modern animal husbandry technologies facilities and equipments. Welfare of animals also influenced by human i.e., handling of animals, rearing conditions, stocking density, adaptive behaviour of animals, moreover, living conditions are the factor with highest expression.

Human affect animals directly (handling, breeding, care) or indirectly. Sudden movements or change in normal features causing anxiety, nervousness and surprize in herd. Indirect impact include environmental factors like microclimate conditions, hygienic status, pattern of feeding and watering, quantity and quality of feed.

Models of animal welfare: Models of animal welfare include basic health and functioning, natural living and affective state. As the animals are sentient, they use to seek positive and avoid negative experiences. *Affective states* in animal emphasize on mental and emotional state including pain, hunger, distress and positive emotional like comfort and happiness.



Dairy animal welfare assessment (DAWA) scale:

Welfare indicators		**Maximum score**
Component A: Animal housing and other facilities (30)		
1.	Housing system & availability of floor space	10.0
2.	Type and height of roof	3.0
3.	Type of floor	2.0
4.	Microclimate protection measures	5.0
5.	Feeding and watering space availability feeding and watering systems with frequency	5.0
6.	Availability of milking parlour/ separate milking place, water for bathing cows, udder washing, cleaning of milking utensils and availability of lighting	5.0
Component B: Feed and feeding practices (30)		
7.	Availability of feeds fodders	10.0
8.	Availability of feed fodder storage area	5.0
9.	Feeding practices of animals' categories wise	10.0
10.	Colostrum, milk feeding to calves & heifer feeding	5.0
Components C: Animal health performance and behaviour (40)		
11.	Productivity	8.0
12.	Body condition score	4.0
13.	*Cow comfort index*	5.0
14.	Cow cleanliness index	4.0
15.	Hock injury scoring	3.0
16.	Human-animal interaction	3.0
17.	Lameness score	4.0
18.	Mastitis incidence	4.0
19.	Reproductive efficiency	3.0
20.	Abnormal behaviour	2.0
Total welfare score		**100**

Categories of farms under DAWA scale:

Farms receiving a total of welfare score less than 40	: Poor
Farms receiving a total welfare score from 40-59	: Average or moderate
Farms receiving a welfare score of 60-80	: Good.
Farms getting a welfare score of more than 80	: Very good.

Requirements: We need to emphasize on improvement in space availability, use of proper bedding materials, optimum working days, insemination after proper heat detection, natural lighting, design of house along with management of manure.

As per the result of different research 1/3rd of cows are inseminated were not in proper estrus. Estrus not detected properly due to short period visual observation and monitoring of cows during feeding automatic heat mount detector and data stored in computer for observation of individual cow. Use of pedometer in legs, voice alteration, chin ball device in teaser bull, pregnancy check along with estrus detection using ELISA, RIA to detect markers of pregnancy.

Walk over weighing, auto-drafting, genetic improvement, feeding, barn environment optimization and health recording are common purpose which utilizes sensors. With advances in proteomics and genomics new bio-markers are discovered to detect diseases at early stage for better management and control assay with higher sensitivity which can provide additional quantitative information on the level of inflammation and problems. Artificial insemination and selection techniques are now shifting towards genomic selection for high rate of genetic gain. Genome maps for poultry and cattle is completed provide opportunities for animal breeding and animal modelling.

If the farms are highly mechanized and automated using modern equipments technologies and precision ensuring food safety and environmental protection.

Modernization and mechanization contribute to development of rural area with respect to employment generation and earning. Animal welfare and human animal relationship is important in both small and large animal husbandry units.

Stress mitigation: Stress is intrinsic components of animal welfare in animal setting. There is definite link between stress of animals and food safety though its understanding is limited. Different stress increases risk of food safety by increasing incidence of infection is proven by microbial endocrinology.

Climate control (Both macro & micro): Production of animal associated with environment therefore sensors (temperature, humidity, air speed, carbon dioxide, ammonia sensors) are used to collect data, there analysis and interpretation. Favourable temperature for cow is 25^{o}C temperature above and below this temperature affect physiology. Barn environment is also very important for farm labours. New technologies provide self-regulating climate-controlled environment towards barn automation.

Conclusion:

Modern animal husbandry practices have made significant progress with respect to production and decrease labour requirement. Rapid adoption of technologies will strengthen further layer of sophistication of farm work. These technologies enable productivity, growth and other benefits. Animal farming offer big scope for technologic applications for more convenient production with

proper care of animals keeping in mind happiness, heath and comfort of animals i.e., welfare concern.

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