Commentary

Animal Welfare: Reflections and Ethical Implications of Animal Biotechnology

Abstract

When adopting diverse biotechnology technologies to boost farm animal productivity, animal welfare is always prioritized. Various animal measures can be used to determine how excellent or awful ethical procedures are. We need to develop some strategies for assessing welfare. The purpose of this paper is to provide a quick overview of both the bad and positive elements of biotechnology in animal welfare.

Keywords: Animal Welfare, Cogitations, Ethics, Biotechnology

Introduction

Agriculture always plays an important role in the economy and national security of any country across the globe. Even agriculture executes significance in catering necessary and essential harvests to the population. Animals are an inevitable part of the accomplishment of such final products. Moreover, demand for livestock products is in the urge to increase by about 70% in the coming 30 years to serve the ever-rising trends in population and hence to resolve the economic needs; preferably in developing nations [1]. Livestock proved a potential coin of protein, draught, and livelihood, indispensably contributing to the Indian economy. According to the 20th livestock census of India-2019, the population of frontline livestock in India, viz., cattle, buffalo, sheep, goat, and pig accounts respectively as 192.49 million, 109.85 million, 74.26 million, 148.88 million, and 9.06 million [2]. In the year 2017-18, the Indian livestock sector contributed around 4.1% to the Gross Domestic Product (GDP) [3]. In global measurement, meat production has been raised by 68% in Asia, 64% in Africa, and 40% in South America since 2000[4]. Thus, it is clear that animals are an integral part of any nation's development whether it is developing and/or developed; and has a direct influence on the respective economies.

Apart from these, the unsung part remains with the development and advancement of biotechnology and its applications in the enhancement of animal product production. Even the research funding in agriculture nowadays is directed to biotechnology, molecular techniques, and cell biology. Biotechnology upgraded and helped the animal sector to grow more productively hitherto in order to touch the present height of achievement[5]. It's always best to prioritize animal health, well-being, and ethics without compromise, regardless of profit considerations.

Animal Welfare

The welfare of animals possesses different out-linings as stated by different mindsets accenting different concerns. One such form is the basic health and functioning of animals free from any disease condition and/or injuries; on the other hand, free natural living expressing their natural behaviour and having natural-exhibiting elements in their own environment ensues another form.

Such different criteria of concern execute one's assessment of animal welfare and also signify different value sets [6]. The scientific researches hinge on such various animal welfare criteria that in turn, guide to rationalize various approaches in research [7].

Animal welfare always remains a longstanding topic of debate as different views are always in notion to establish its validity. For example, the view of good welfare lies within the high-health confinement system; this outlook had been conferred from intensive animal farmers whereas confinement leads to poor development been raised by critics. In this aspect of confinement systems, the perception arose for the first in the book written by Ruth Harrison, an English animal advocate, Animal Machines; in which pallid and despondent lives of laying hens in cages and veals in crates were stated [8]. Likewise, Animal Liberation by Peter Singer talked about the confinement that rejected any moral justification regarding the differences in the 'emotions' of man and animal [9]. Even as the word 'emotions' does not illustrate states like thirst, hunger, etc., 'affective states' have been computed in place which calculates all emotions rather than hedonically neutral ones. Similarly, various such thoughts and ideas have been pondered with the passage of time strengthening the necessity of animal welfare. Moreover, the degree and standards of welfare principle vary considerably among various contexts. Hence, are under continuous scrutiny by animal welfare connoisseurs worldwide. Furthermore, steps for establishing indicator(s) to provide the best information are also in progress as welfare science uses different such measures viz, behaviour, physiology, disease, immunosuppression, etc. Emphasizing the impact of biotechnology on animal welfare is crucial for fostering ethical practices and ensuring the well-being of animals involved in research and production. Integrating robust ethical considerations into biotechnological developments can mitigate potential harm and promote sustainable advancements in animal welfare standards.

Now the questions arise, why it become necessary to account for animal welfare so strictly, and why its implementation has gained so much importance in the recent past? The answer lies with the ill-treatment of the animals in different facets viz, farming system, draught practices, laboratory experimentations, etc. Two basic reasons comprise poverty and ignorance/lack of knowledge. Draught and pack animals are often overburdened and abused in many countries [10]. Even the animals are ill-fed during their idle hours of the year. Torment during pre-slaughter stages in abattoirs, non-practicing of stunning processes before slaughter, and practicing of the inhumane slaughter of animals question the welfare of animals valiantly. The usage of animals in circuses is another prominent evidence of animal exploitation. In fact, these derelictions underline the cruelty to animals rather. Therefore, animal adversity can be well linked to cruelty to animals; these are directly correlated.

To reduce the total effects on animals and to define the welfare of animals, many researchers use the five freedoms concept. It was proposed in 1965 by the Brambell Committee which was redefined by the Farm Animal Welfare Council (FAWC) of the United Kingdom in the year 1979. This five-freedoms concept states that animals should be

- free from hunger and thirst (providing access to proper diet and fresh drinking water)
- free from any kind of discomfort (providing an appropriate living environment)
- free from pain, injury, and diseases (prevention of so and immediate proper treatment on diagnosis, detection)

- free from fear and distress (allowing proper facilities, a company of animal's own kind, avoiding mental instabilities)
- free to express normal behaviour (allowing animal's degree of life)

Hence, the conception has been exercised as a standard conceptual framework worldwide for it serves the fundamental principles of animal welfare. These five domains focus on the basic physical and functional welfare which is depicted in Figure 1 and the essentials of good animal welfare in Figure 2. Besides, a counterpart of this approach has been projected out with the description of 12 criteria, quantifying animal welfare by the Welfare Quality Project (funded by European Commission). Therefore, animal welfare can be defined as the negative or positive perspective of animals' life determined by their livelihoods which they feel at a particular place and time. The definition stated by World Organization for Animal Health (OIE) is given in Article 7.1.1 of the Terrestrial Animal Health Code; it says:

"*how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress*."

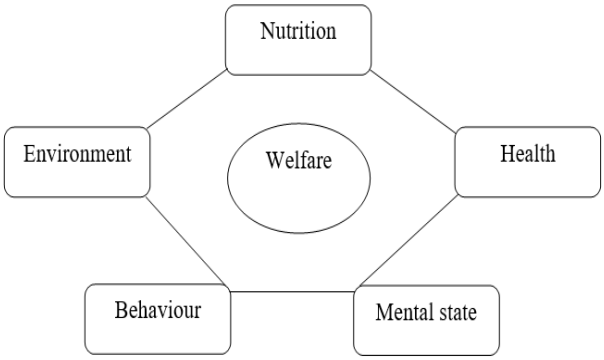

Figure 1; Welfarefocused on the Five Domains

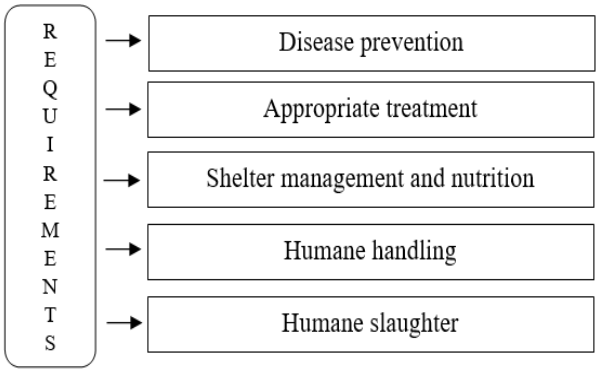

Figure 2; Requirements of good animal welfare

Legality and Ethics

To have performed any work by animals, it is only being done when it is indeed necessary and their use is scientifically satisfied as well as ethically justified. People cannot violate the rights of animals and harm their dignity in order to meet their inevitabilities. In India, Article 51A (g) of the Constitution clearly mentioned that it is the fundamental duty of every Indian to have harmony and empathy for wildlife and living beings (it says: "*to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures*"). Even the Prevention of Cruelty to Animals Act had been passed in 1960 by the Indian Parliament; in which section 15 provides the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA, now CCSEA) order to monitor, supervise and regulate animal experiments. Furthermore, ethical concerns regarding animal use in Indian research are gaining much pace in the current stretch of the clock in as much as firm guidelines are laid by the competent regulatory authority (CCSEA). Whereas now approval for legitimate scientific research from CCSEA has become obligatory instead. Most experimental animals are under the supervision of the committee; the relative sentience of animals is measured according to the evolutionary scale or phylogenetic scale (higher than invertebrates). It can be considered as shown in increasing format of sentience: invertebrates < birds < rodents < canines and felines < bovines and equines < primates (monkey) < advanced primates (chimpanzee).

The concept of 3Rs (Replacement, Reduction, Refinement) is also recently achieving recognition among Indian scientists because 3Rs park principles for research, testing, and teaching with the exercise of animals; in fact, it should be invariably incorporated in the design and conduct of scientific and educational activities involving animals. The 4th R, i.e., Responsibility of researchers, dealing with the post-experimental care, management, and rehabilitation of animals, was proposed and introduced recently by Dr. Ron Bank. This is the most important, crucial, and mandatory part practically and defines the true meaning of animal welfare. This responsibility is in concordance with Rule 9 (cc) of the Breeding of and Experiments on Animals (Control and Supervision), 1998.

Why it is necessary? Is it only to avoid pain and suffering? Or is it to allow animals to live naturally only? There lie many such questions behind the adoption of legitimacies in animal welfare. But the elementary ripostes comprise contractarianism, utilitarianism, animal rights, views, contextual approaches, and respect for nature. As animals might not assault in the case, like in distressful experiments, contractarianism indicates that a person always ought to well treat animals that need to be fit to carry out the purpose. Utilitarianism is linked with the consequences, important and foremost in any ethical decision-making to bring out the best possible outcomes. The 'right', the most common response that comes naturally to a common mind, is utmost and obvious as it signifies the 'self-defense' of any non-human living organism. Also, it reminds the respectfulness towards their emotions and dignity as a whole. Arguments are often there emphasizing that utilitarianism and rights lack offering weight to different human-animal relations like empathy. As a result, contextual approaches accentuate moral emotions viz., empathy, sympathy, and care. So, the story is not only all about animals' sufferings, wellness, and respect, it is also equally important with the expression of the extinction of animals. This is what respect for nature states. No activities should be entertained that disrespect the nature and community of animals.

Thus, ethics in veterinary is the application of principles, rules, and theories for the resolution of the ethical dilemmas detected in the practice of veterinary. Therefore, veterinary ethics which is a subfield of bioethics, concerns the practical application and individual conducts towards animal service system [11]. It has been classified into four branches, viz., Descriptive veterinary ethics, Official veterinary ethics, Administrative veterinary ethics, and Normative veterinary ethics.

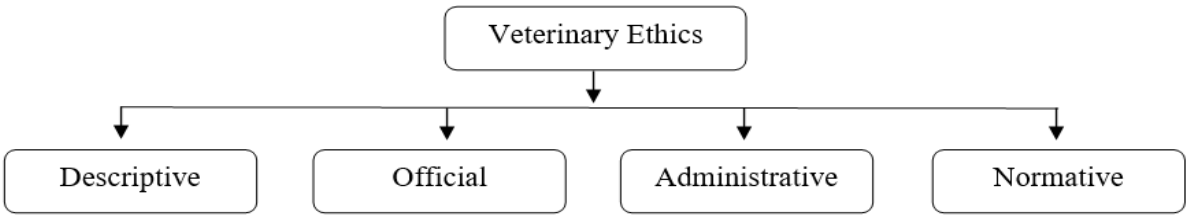

Figure 3; Descriptive veterinary ethics

Description veterinary ethics deals with an individual's perspective of ethical concepts and reasoning, more commonly the moral perceptions and beliefs. The official veterinary ethics, as the name indicates, it is oriented towards official standards employed among any particular organization, association, or group accordingly to meet the norms of animal welfare. It boldly determines the obligations towards self-regulation and self-accountability; in failure to maintain the standards expulsion from that particular organisation as a penalty can be awarded. Again, governmental bodies regulated ethics, and administrative standards (codes of conduct) are grouped into administrative veterinary ethics. These are implemented for veterinarians and para-veterinarians engaged in animal health service in order to smooth regulation of the veterinary establishment and mainly to provide safe public health. Violation to follow will lead desperately to strict actions like deregistration, suspension, and even can result in prosecution. Normative veterinary ethics is the most fundamental one, dealing with values, elucidating the correct norms to upgrade and regulate the veterinary activities as a whole. Descriptive ethics on the other hand, only circulate about facts. The provision of solving ethical dilemmas helps to develop principles of standards, rules, and codes. The advantage over descriptive ethics is that the normative raises questions/queries of interest for the former.

Animal Biotechnology

Animal biotechnology is the branch of biotechnology that uses the application of molecular biology to provide genetically modified or engineered animals for advancement in their suitability towards various applications, viz., agricultural, pharmaceutical, industrial, etc. which in turn help synthesize therapeutic proteins, and improve growth and disease resistances. As livestock is the key to economic growth in developing countries mostly, the technology used to upgrade their production is the utmost for viable agriculture. Now the question arises, why it is necessary to engineer animals and their naturality? Animals are a rich source of biodiversity. Many of the animal species and breeds possess genes and traits of superiority; below in Table 1 are some of the important breeds/species, particularly in developing countries like India.

Table 1; Animals with their quality

Animal	**Quality**
Buffalo	High-fat content and quality protein in milk
Yak, Mithun	Adaptability in high-altitude
Specific goat breeds	Pashmina and tools
Garole sheep	Twinning genes
Black Bengal goat	High prolificacy
Andaman goats	High salt tolerant
Sheep, goat, and camel breeds	Tropical arid climate adaptability, high lignin tolerance
Many species of animals	Stress and disease resistance

The desirable ones are selected and benefit from animal productive-management systems including artificial insemination, embryo transfer technology, and other assisted reproductive methodologies/technologies for genetic improvement of the particular breeds or species. This aims for significant economic returns. Its application extends to the therapeutic field also; the development of various diagnostic kits and production of vaccines are equally important to prevent animals and/or humans from facing any challenges due to diseases locally or globally. However socioeconomic considerations are always to be taken into account. It has been mentioned that contributions bestowed by the developing world in livestock production are far greater than only production in cases of the developed states; that is why advantages of better outcomes in the biotechnological applications are projected in such territories compared to the latter and much progress has been achieved in the current past. A few such factors include low input and cost in the production system, high stress, and particular disease-resistant animal breeds, substantial biodiversity, integrated production system, etc.

Conclusion

Biotechnology has been blessed with transgenics, characterization of genetic variability, assisted technologies like artificial insemination, embryo transfer technology, in vitro embryo production, vaccine development, diagnostic and epidemiological techniques, animal nutrition like probiotics, single-cell proteins, enzymes, etc.

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