CPCSEA GUIDELINES FOR POULTRY/ BIRDS FACILITY

Government of India
Ministry of Fisheries, Animal Husbandry and Dairying
Department of Animal Husbandry and Dairying
Committee for the Purpose of Control and Supervision of Experiments on Animals
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Good Management Practices (GMP) for Poultry/ Birds facilities is intended to assure quality maintenance and welfare of Poultry/ Birds used in experimentation/ laboratory studies while conducting biomedical, breeding, nutritional, behavioural research and testing of products.

1. GOAL

The goal of these Guidelines is to promote humane care of poultry used in breeding, nutritional, biomedical and behavioural experimental research and testing with the basic objective of providing specifications that will enhance poultry production, well being and quality experimentation in pursuit of advancement of biological knowledge relevant to humans, animals and poultry.

Poultry is defined as birds with potential of economic output like Chicken, Quails, Turkey, Ducks, Guinea fowls, Pigeon, Ostrich etc.

2. LOCATION OF POULTRY FACILITIES TO LABORATORIES

Good poultry husbandry and humane comfort and health protection require physical separation of poultry facilities from personnel areas such as offices, break room, training and education rooms.

- Poultry are very sensitive to their living conditions. It is important that they shall be housed in an isolated building located away from human habitations and not exposed to dust, smoke, noise, wild rodents, insects and birds. The building, cages and environment of poultry sheds are the major factors that affect the quality of poultry.

- Careful planning should make it possible to place poultry sheds adjacent to laboratories, but provide barriers such as entry locks, corridors, or floors.

  While planning poultry experimental facility the space should be well divided for various activities. The poultry sheds should occupy about 50-60% of the total constructed area and the remaining area should be utilized for services such as stores, washing, office and staff, machine rooms, quarantine, and corridors. The environment of poultry sheds (Macro-Environment) and poultry cage (Microenvironment) are factors on which the production and experimental efficiency of the poultry depends. Since poultry are very sensitive to environmental changes, sharp fluctuations in temperature, humidity, light, sound, and ventilation should be avoided. The recommended space requirements for poultry shed, for different species are given in **(Annexure – 5).**

3. FUNCTIONAL AREAS

Sufficient area is required to ensure:

- Separation of species or isolation of individual projects when necessary.
- Receive, quarantine, and isolation and housing

In facilities that are small, maintain few poultry or maintain poultry under special conditions (e.g., facilities exclusively used for housing germfree colonies or poultry in runs and pens) some functional areas listed below are optional. Professional judgement must be exercised when developing a practical system for poultry care.

- Specialized laboratories or
- Individual areas contiguous with or near poultry housing areas for such activities as surgery, intensive care, necropsy, radiography, preparation of special diets, experimental manipulation, treatment, and diagnostic laboratory procedures containment facilities or
- Equipment, if hazardous biological, physical, or chemical agents are to be used
- Receiving and storage areas for food, bedding Pharmaceuticals and biologics, and supplies
- Space for administration, supervision, and direction of the facility
- Showers, sinks, lockers and toilets for personnel
- Area for washing and sterilization equipment and supplies,
- Area for autoclave and equipment
- Food, and bedding storage areas
- Area for holding soiled and cleaned equipment
- Area for repairing cages and equipment
- Area to store wastes disposal prior to incineration or removal

4. PHYSICAL FACILITIES

The design and size of a poultry facility depends on the scope of institutional research activities, poultry to be housed, physical relationship to the rest of the institution, and geographic location. A well planned, properly maintained facility is an important element in good poultry care.

(a) Housing facility should be compatible with the needs of the species to be housed.
(b) Housing facility should be designed and operated to facilitate control of environmental factors to exclude vermin and limit contamination associated with the housing of poultry, delivery of food, water, bedding, and the entry of people and other animals.
(c) Housing facility should be maintained in good condition. Walls and floors should be constructed of durable materials with surfaces that can be cleaned and disinfected easily
(d) Housing facilities should be kept clean and tidy and operated to achieve maximum hygiene.
(e) There should be a pest control programme.
(f) There should be adequate and appropriate storage areas for feed, bedding and equipment.
(g) Deodorants designed to mask animal/poultry odours should not be used in Housing facilities as they may expose poultry to volatile compounds which can alter metabolic processes. In addition, deodorants must not be used as a substitute for good cage and equipment cleaning practices and good ventilation.
(h) Cleaning practices should be monitored on a regular basis to ensure effective hygiene and sanitation. This may include visual inspection, monitoring water temperatures and

microbiological testing of surfaces after cleaning.

(i) There should be proper water supply and drainage.
(j) There should be adequate contingency plans to cover emergencies such as flooding and fire, or the breakdown of lighting, heating, cooling or ventilation.
(k) In the interest of disease prevention and general poultry welfare, access to the Housing facilities by unauthorised persons should be restricted.

I. **Building Materials** should be selected to facilitate efficient and hygienic operation of poultry facilities. Durable, moisture-proof, fire-resistant, seamless materials are most desirable for interior surfaces including vermin and pest resistance.

II. **Corridor(s)** should be wide enough to facilitate the movement of personnel as well as equipments and should be kept clean.

III. **Utilities** such as water lines, drain pipes, and electrical connections should preferably be accessible through service panels or shafts in corridors outside the poultry sheds.

IV. **Doors** should not get rust and should be vermin and dust proof. They should be fitted properly within their frames and provided with an observation window. Door closures may also be provided. Rodent barriers can be provided in the doors

V. **Floors** should be or either monolithic or epoxy smooth, moisture proof, non-absorbent, skid-proof, resistant to wear, acid, solvents and adverse effects of detergents/ disinfectants. They should be capable of supporting racks, equipment, and stored items without becoming gouged, cracked, or pitted, with minimum number of joints.

VI. **Drains** are essential in all rooms. Floor in such rooms can be maintained satisfactorily by wet vacuuming or mopping with appropriate disinfectants or cleaning compounds. However, where floor drains are used, the floors should be sloped to allow rapid removal of water and drying of surfaces to prevent high humidity, At the inlet and outlets of the drains should be fitted with wire mesh guard to prevent wild rodent entry.

VII. **Walls & Ceilings**

Walls should be free of cracks, unsealed utility penetrations, or imperfect junctions with doors, ceilings, floors and corners. Surface materials should be capable of withstanding scrubbing with detergents, disinfectants and the impact of water under high pressure. Materials used for construction of roof should cater needs of local climatic condition to provide comfort to the poultry.

VIII. **Storage Areas**

Separate storage areas should be designed for feed, bedding, cages and materials not in use. Refrigerated storage, separated from other cold storage, it is essential for storage of dead birds and birds tissue waste.

IX. **Facilities For Sanitizing Equipment And Supplies**

An area for sanitizing cages and ancillary equipment is essential with adequate water supply.

X. **Experimental Area**

All experimental procedures in poultry should be carried out in a separate area away from the place where poultry are housed.

5. ENVIRONMENT

(a) Temperature And Humidity Control

Suitable temperature and humidity control measures for providing comfortable zone as per their age and species (**Annexure - 6)**.

(b) Ventilation

(1) There should be proper ventilation in poultry housing facility **(Annexure -7)**.
(2) Levels of Ammonia and Carbon dioxide (NH_3 and CO_2) monitored. Ammonia levels greater than 20 ppm have a negative effect on poultry performance. The Ammonia levels must never be above 25 ppm. Suitable devices may be installed for measuring NH_3 and CO_2(Ammonia and Carbon dioxide meters)
(3) Heating, ventilation and air conditioning systems should be designed to have operation with a standby system. Ventilation to have 12-15 air cycles per hour. The poultry facility and human occupancy areas should be ventilated separately.

(c) Power And Lighting

The electrical system should be safe and provide appropriate lighting with sufficient number of power points installed to provide adequate illumination for people to work and a lowered intensity of light for the poultry.

The distribution of light within poultry house will depend upon placement of the lamps. The lamps should be placed so that the maximum illumination value is spread over the largest area. This depends upon the physical dimensions and equipment in the building.

In both breeder/layer and broiler facilities, it is best to place the lamps such that the darkest areas have at least 0.5 -0.75 fc of light. The distance between lamps will depend upon the size of the lamp and the physical surroundings of the building, such as walls, posts, ceiling reflectivity, etc. Duration of lighting requirement depends upon the age and type of birds as given in **Annexure-8**.

(d) Noise Control

Poultry shed should be located away from the crowded areas to avoid noise problems to birds. Ideal sound levels inside the poultry house should range between 50 to 90 dB during the daytime. Ample trees should be planted around shed to act as sound barrier.

6. POULTRY HUSBANDRY

i. Caging Or Housing System

(a) The caging or housing system is one of the most important elements in the physical and social environment of research birds. It should be designed carefully to facilitate poultry wellbeing, meet research requirements, and minimize experimental variables.

The housing system should:

- Provide adequate space , permit freedom of movement, normal postural adjustments, and have a resting place appropriate to the species; **(Annexure – 5)**
- Provide a comfortable environment
- Provide an escape proof enclosure that confines poultry safety
- Provide easy access to food and water
- Provide adequate ventilation
- Meet the biological needs of the poultry, e.g., maintenance of body temperature, urination, defecation, and reproduction
- Keep the birds dry and clean,
- Facilitate research while maintaining good health of the poultry.

(b) They should be constructed with sturdy, durable materials and designed to minimize cross-infection between adjoining units. Galvanized Iron (GI) and stainless steel cages should be used for housing poultry. Material that rust is not permitted. However, if there is any rust in the cages, it should be replaced / repaired to make them rust free.

(c) To simplify servicing and sanitation, cages should have smooth, surfaces that neither attract nor retain dirt and a minimum number of ledges, angles, and corners in which dirt or water can accumulate. The design should allow inspection of cage occupants without disturbing them. Feeding and watering devices should be easily accessible for filling, changing, cleaning and servicing.

(d) Cages, runs and pens must be kept in good condition to prevent injuries to birds, promote physical comfort, and facilitate sanitation and servicing. Particular attention must be given to eliminate sharp edges and broken wires.

ii. Deep litter or Free range housing:

- Provide concrete walls or Galvanized iron mesh fencing
- Provide soft, moisture free, water absorbable litter material for bedding. Litter materials such as wood shavings; saw dust, paddy husk, peanut shell, paddy chaff, chopped straw and such other materials that absorb moisture well can be used depending upon the cost and availability. Spread the litter to a depth of 5 cm on the floor before introducing chicks and build it up to a depth of 15 cm by adding litter material, at the rate of about 2 cm per week.
- Provide easy access to drinkers and feeders.
- Provide proper ventilation

- Maintain the litter dry. The litter should be stirred at least once in a week-wet litter if any should be replaced immediately with new dry litter
- On the deep litter, provide 700 cm^2 floor area per chick till 8 weeks of age. In a hover with one meter diameter, 250 chicks can be brooded. The hover can be metal or bamboo basket fitted with a heat source. The size and number of the hovers depend on the number of chicks to be brooded. Units of 250 chicks are ideal for efficient management. The hover can be placed at appropriate height from the floor either by hanging it from the roof or by placing it over bricks or stones so that chicks can go in and out easily. Temperature required for brooding is 1 –2 Watt/chick. Use five bulbs of 60 Watts per unit of 250 chicks.

7. FEED

(a) Poultry feed should contain all essential nutrients as specified for each category of the bird **(Annexure – 9)**. The feed should be palatable, free from contaminants, and nutritionally balanced. Adequate feed should be offered twice daily unless the experimental protocol requires otherwise.

(b) Feeders should allow easy access of feed, while avoiding contamination by droppings.

(c) Feed should be provided in sufficient amounts to ensure standard growth and production.

(d) Feed should contain adequate nutrition, with proper formulation and preparation; and ensure free from chemical and microbial contaminants within permissible limits; bio-availability of nutrients should be at par with the nutritional requirements of the birds. Feed should contain minimum moisture, required crude protein, metabolizable energy, essential vitamins, minerals and crude fat for providing adequate nutrition for growth, immunity and wellbeing.

(e) Areas in which feeds are processed or stored should be kept clean and enclosed to prevent entry of insects / other animals/ birds.

(f) Feeders should not be transferred from room to room unless cleaned and properly sanitized.

(g) Poultry feed should be tested invariably for the presence toxins such as aflatoxins and ochratoxins etc. which should not exceed permissible limits. Records of feed testing should be maintained in the facility.

8. WATER

(a) Poultry should have continuous access to fresh, potable, uncontaminated drinking water, according to their requirements. Periodic monitoring of microbial contamination in water is necessary.

(b) Watering devices, nipple drinkers and automatic waterers should be examined routinely to ensure their proper operation. Sometimes it is necessary to train chicks to drink water from automatic watering devices.

(c) Periodical maintenance of drinkers and water channels to avoid leakage and scaling.

9. SANITATION AND CLEANLINESS

(a) Sanitation is an essential activity in a poultry house. Poultry sheds; corridors, storage spaces, and other areas should be properly cleaned with appropriate detergents and disinfectants as often as necessary to keep them free of dirt, debris, and harmful agents of contamination.

(b) Cleaning utensils, such as mops, pails, and brooms, should not be transported between poultry pens.

(c) Where poultry waste is removed by hosing or flushing. This should be done at least 2 -3 times in a weak in cage system.

(d) Cages should be sanitized before birds are placed in them. Poultry cages, and accessory equipment, such as feeders and watering devices, should be washed and sanitized frequently to keep them clean and contamination free.

(e) Disinfection can also be accomplished with appropriate chemicals. Equipment should be rinsed free of chemicals prior to use. Periodic microbiological monitoring is useful to determine the efficacy of disinfection or sterilization procedures.

(f) Some means for sterilizing equipment and supplies, such as an autoclave or gas sterilizer, is essential when pathogenic organisms are present. Routine sterilization of cages, feed and bedding is also essential besides care is taken to obtain cleaning materials from reliable sources. Where hazardous biological, chemical, or physical agents are used, a suitable system of equipment monitoring may be adopted.

10. ASSESSING THE EFFECTIVENESS OF SANITATION

(a) Sanitation practices should be monitored appropriately to ensure effectiveness of the process and materials being cleaned; it can include visual inspection of the materials, monitoring of water temperatures, or microbiologic monitoring.

(b) A decision to change the frequency of bedding change or cage washing should be based on factors such as the concentration of ammonia, appearance of the cage, condition of the bedding, number and size of the birds housed in the cage.

11. WASTE DISPOSAL

(a) Wastes should be removed regularly and frequently. All waste material should be collected and disposed off in a safe and sanitary manner. The most preferred method of waste disposal is incineration. Incinerators should be in compliance with all central, state, and local Public Health and Pollution Control Board regulations.

(b) Waste containers containing poultry/birds tissues, carcasses, and hazardous wastes should be lined with leak - proof, disposable liners. If wastes must be stored before

removal, the waste storage area should be separated from other storage facilities and free of flies, cockroaches, rodents, and other vermin. Cold storage might be necessary to prevent decomposition of biological wastes. Hazardous wastes should be rendered safe by disinfection, decontamination, or other appropriate means before they are disposed off from poultry facility.

12. PEST CONTROL

Adaptation of programs designed to prevent, control, or elimination of infestations and pests are essential in the poultry sheds. Best results can be achieved by giving contracts to people/firm specialized in pest control.

13. EMERGENCY, WEEKEND AND HOLIDAY CARE

There should be an institutional policy to care birds by qualified personnel every day, including weekends and holidays, to safeguards their wellbeing including emergency veterinary care. In the event of any emergency, institutional security personnel and fire or police officials should be able to reach responsible persons of the poultry facility. That can be enhanced by prominently posting emergency procedures, names, and telephone numbers in poultry facilities, in the security department and near telephone. A disaster plan that takes into account both personnel and poultry should be prepared as part of the overall safety plan of the poultry facility.

14. RECORD KEEPING

It is essential that poultry House should maintain following records:

- Poultry House plans, which includes typical floor plans, all fixtures etc.
- Poultry House staff records - both technical and non - technical
- Health records of staff and birds
- All SOPs relevant to experiments, care, breeding and management of poultry
- Breeding, stock, purchase and sales records
- Minutes of Institutional Animal Ethics Committee Meetings
- Records of experiments conducted with the number of birds used (copy of Form D)
- Mortality, Post-mortem Records,.
- Clinical records of sick birds.
- Records of staff training in poultry activities
- Water, feed and bedding materials analysis reports
- Health monitoring Records.
- Rehabilitation Records.

15. STANDARD OPERATING PROCEDURES (SOPs) / GUIDELINES

The Institute should maintain SOPs describing procedures / methods adapted with regard to poultry Husbandry, maintenance, breeding, poultry house activities microbial testing and experimentation.

A SOP should contain the following items:

- Name of the Author

- Title of the SOP
- Date of approval
- Reference of previous SOP on the same subject and date (Issue no and Date)
- Location and distribution of SOP's with signature of each recipient.
- Objectives
- Detailed information of the instruments used in relation with poultry with methodology (Model no., Serial no., Date of commissioning, etc)
- The name of the manufacturer of the reagents and the methodology of the analysis pertaining to poultry
- Normal value of all parameters
- Hazard identification and risk assessment

16. PERSONNEL AND TRAINING

(a) The selection of poultry facility staff, particularly the staff working in poultry sheds or involved in transportation, is a critical component in the management of a poultry facility.

(b) The staff must be provided with all required protective clothing (face masks, head covers, aprons, gloves, gumboots, other footwear etc.) while working in poultry house. Facilities should be provided for change over with lockers, wash basin, toilets and bathrooms to maintain personal hygiene. It is also important to have a regular medical check-up arranged for the workers to ensure that they have not picked up any zoonotic infection and also that they are not acting as a source of transmission of any infection to the birds.

(c) Initial in-house training of staff at all levels is essential. A few weeks must be spent on the training of the newly recruited staff, teaching them the poultry handling techniques, cleaning of cages and importance of hygiene, disinfection and sterilization. They should also be made familiar with the activities of normal healthy and sick birds so that they are able to spot the sick bird during their daily routine check up of cages.

17. VETERINARY CARE

Adequate veterinary care must be provided with a qualified veterinarian who has training and experience in poultry sciences and medicine.

a. Daily observation of birds can be accomplished by a technician other than a veterinarian. However, a mechanism of direct and frequent communication should be adopted so that timely and accurate information on problems in poultry health, behaviour, and wellbeing is conveyed to the attending veterinarian.

b. The veterinarian can also help the establishment in designing appropriate policies and procedures for ancillary aspects of veterinary care, such as use of appropriate methods to prevent and control diseases (e.g. vaccination and other prophylaxis, disease monitoring and surveillance, quarantine and isolation), operative and post-operative care, diagnosis and treatment of diseases as well as injuries. Reviewing protocols and proposals, poultry husbandry and welfare; monitoring occupational health hazards containment, and zoonosis control programs; and supervising poultry

nutrition and sanitation. Institutional requirements will determine the need for full-time veterinary services.

18. POULTRY PROCUREMENT

a. Poultry (like Chicken, Quails, Turkey, Ducks, Guinea fowls, Pigeon, Ostrich etc.) must be acquired from lawfully registered commercial hatcheries and breeding farms.

b. A health surveillance program for screening incoming poultry should be carried out before purchase to assess poultry quality. Methods of transportation should also be considered **(Annexure – 1).**

c. Each consignment of poultry should be inspected for compliance with procurement specifications, and the poultry should be quarantined and stabilized according to procedures appropriate for the species and circumstances.

19. QUARANTINE AND SEPARATION

Quarantine is the separation of newly received poultry from those already in the facility until the health and possibly the microbial status of the newly received poultry have been determined. An effective quarantine minimizes the chance for introduction of pathogens into an established flock. The duration of quarantine in poultry varies from one week to three weeks. However, duration of quarantine can be increased depending on type of infection / if any suspected infection is noticed in the poultry.

b. For maintenance and housing of different poultry species, separate rooms and separate attendants are required. Sick birds must be isolated and kept separately and separate set of personnel should be identified for taking care of these sick birds. Other workers should be restricted from entering in to the facilities unless otherwise required. After handling the birds in isolation they should not handle any other birds in the facilities.

20. MONITORING, DIAGNOSIS, TREATMENT AND CONTROL OF DISEASE

(a) All birds should be observed for signs of illness, injury, or abnormal behaviour by poultry house staff. As a rule, this should occur daily, but more-frequent observations are warranted during experimentation and when birds are ill or have a physical discomfort. It is imperative that appropriate methods be in place for disease monitoring and diagnosis **(Annexure - 2 & 3).**

(b) Post-mortem examination and signs of illness, distress, or other deviations from normal health condition in poultry should be reported promptly to ensure appropriate and timely delivery of veterinary care. Poultry that show signs of a contagious disease should be isolated from healthy birds in the flock. If an entire room of birds is known or believed to be exposed to an infectious agent (e.g. *Ranikhet Disease*), the group should be kept intact and isolated during the process of diagnosis, treatment, and control. Poultry suffering from contagious diseases like Avian Influenza must be euthanized as per Department of Animal Husbandry, Dairying and Fisheries (DADF) guidelines to prevent its spread to other birds and often bird handlers. (http://dadf.gov.in/sites/default/filess/Action%20Plan%20-%20as%20on23.3.15.docx-

final.pdf10.pdf).

(c) The isolation, quarantine and stabilization programs for newly arrived poultry are necessary to provide time to assess their health status, allow them to recover from the stress of shipment and an opportunity to adapt to their new environment. The extent of these programs depends on several factors, including species and source of the poultry as well as their intended use.

(d) Preventive medicine programs such as vaccinations, ecto- and endoparasite treatments and other disease control measures should be initiated according to currently acceptable veterinary practices appropriate to the particular species and source. Only poultry of defined health status should be used in research and testing unless a specific, naturally occurring or induced disease state is being studied. Systems should be established to protect poultry within the institution from exposure to diseases.

(e) Transgenic and mutant poultry may be particularly susceptible to diseases and may require special protection to ensure their health. Systems to prevent spread of disease may include facility design features, containment/isolation sheds, and use of standard operating procedures. Training of poultry care and research staff is essential to prevent spread of poultry diseases.

(f) Disease surveillance is a major responsibility of the Veterinarian and should include routine monitoring of flocks for the presence of parasitic and microbiological agents that may cause overt or in apparent disease. The type and intensity of monitoring necessary will depend upon professional veterinary judgment and the species, source, use and number of birds housed and used in the facility.

(g) Diagnostic laboratory services must be available and used as appropriate. Laboratory services should include necropsy, histopathology, microbiology, clinical pathology, serology, and parasitology as well as other routine or specialized laboratory procedures, as needed. It is not necessary that all of these services be available within the poultry house (Facilities from other laboratories with appropriate capabilities may be out sourced).

(h) Poultry with infectious / contagious disease must be isolated from others by placing them in isolation units or separate rooms appropriate for the containment of the agents of concern. In certain circumstances, when an entire group of poultry is known or suspected to be exposed or infected, it may be appropriate to keep the group intact during the time necessary for diagnosis and treatment, for taking other control measures, or for completion of a project.

(i) The veterinarian must have authority to use appropriate treatment or control measures, including euthanasia in consultation with at least one more additional veterinarian if required, following diagnosis of poultry disease or injury. If possible, the veterinarian should discuss the situation with the principal investigator to determine a course of action consistent with experimental goals. However, if the principal investigator is not available, or if agreement cannot be reached, the veterinarian must have authority to act to protect the health and well-being of the institutional poultry flock and workers.

21. POULTRY CARE AND TECHNICAL PERSONNEL

(a) Poultry care programs require technical and husbandry support. Institutions should employ people trained in poultry science or provide both formal and on-the-job training to ensure effective implementation of the program.

22. PERSONAL HYGIENE

(a) It is essential that the poultry care staff maintain a high standard of personal cleanliness. Facilities and supplies for meeting this obligation should be provided with appropriate Personnel Protective Equipment (PPE) e.g. showers, change of uniforms, footwear etc.

(b) Clothing suitable for use in the poultry facility should be supplied and laundered by the institution. A commercial laundering service is acceptable in many situations; however, institutional facilities should be used to decontaminate clothing exposed to potentially hazardous microbial agents or toxic substances. It is acceptable to use disposable gloves, masks, head covers, coats, coveralls and shoe covers. Personnel should change clothing as often as is necessary to maintain personal hygiene. Outer garments worn in the poultry shed should not be worn outside the poultry facility.

(c) Washing and showering facilities appropriate to the program should be available. Personnel should not be permitted to eat, drink, smoke or apply cosmetics and perfumes in poultry sheds. They should finish the work as early as possible and sit somewhere else, outside and not in the poultry sheds. A separate area or room should be made available for these purposes.

23. POULTRY EXPERIMENTATION INVOLVING HAZARDOUS AGENTS

(a) Institutions should have policies governing experimentation with hazardous agents. Institutional Bio-safety Committee whose members are knowledgeable about hazardous agents are in place in most of the higher-level education, research institutes and in many pharmaceutical industries for taking care of safety issues. This committee shall also examine the proposal on poultry experiments involving hazardous agents in addition to its existing functions **(Annexure -4)**.

(b) Since the use of poultry in such studies requires special considerations, the procedures and the facilities to be used must be reviewed by both the Institutional Bio-safety committee and Institutional Animal Ethics Committee (IAEC). Disposing of tissues and fluids from such used poultry must also be appropriately governed as per bio-safety regulations.

24. SURGICAL PROCEDURES IN POULTRY AND OTHER BIRDS

(a) Debeaking, dubbing, de-spurring and caponization can be done as per the standard procedures and need of experiment with the approval of IAEC.

(b) Debeaking is an act of reducing the length of the beak of poultry birds. The purpose of doing this is to prevent feather pulling and cannibalism and to reduce feed wastage. It is a delicate operation, and if it is improperly done, it may leads to difficulties in drinking and eating, which directly leads to poor growth, unevenness in flock and even mortality as a result blood loss. The operation can be carried out at 7-9 days of age and 8-10 weeks of age. Do not debeak birds if the flock is not in good health or if it is undergoing from vaccine reactions. Addition of Vitamin K to the drinking water 48 hours prior to debeaking and will prevent haemorrhages. It is required to check the equipment and make sure that the debeaking blade has the right temperature to cauterize, but not so high to form a blister on the beak later. Rushing the process, a too high rate (number of birds/minute) could lead to a higher chance of errors and poor uniformity. It is advisable to clean the blades with sandpaper after 5,000 chicks and make sure the tongue of the bird is not burned. Increase the water level in the drinkers and the pressure in the pipes to make it easy for the birds to drink. Make sure that the depth of the feed is adequate and do not empty the feeders for at least a week following beak trimming. It is important to give birds anti-stress or multivitamins before and after the operation to reduce the stress.

(c) Dubbing is the removal of all or part of the male comb. It is usually carried out on day-old chicks using sharp scissors. This should be carried out in chicks over 72 hours by trained personnel only or a Veterinarian. .

(d) De-spurring is the removal of the spur bud on the leg and normally carried out on day-old males using a heated wire. Prominent spurs can damage females during mating.

(e) Caponization is the surgical operation for removing the testicles and neutering the birds. Procedure should be undertaken only by an individual with appropriate clinical training and practical experience; this would usually be a veterinarian. Equipment and consumables for general anaesthesia and surgery, including surgical instruments and consumables suitable for the size of the bird.

(f) Declawing is removing the dew and pivot claw from the feet and is carried out on day-old males to prevent damage to females during mating. Only a trained, competent person can carry out declawing.

(g) Toe removal is normally carried out on day-old chicks using sharp scissors and should only be undertaken by trained personnel or a Veterinarian in chicks over 72 hours old.

25. DURATIONS OF EXPERIMENTS

No poultry should be used for experimentation for more than 2 years unless adequate justification is provided.

26. PHYSICAL RESTRAINT

(a) Physical restraint is extremely stressful for birds even for those that outwardly appears to be calm. Bird must be restrained in such a way so that its wings and legs are firmly but gently controlled and not allowed to flap or kick about. In case of long neck birds, the neck must be controlled so that head, eye and neck trauma is avoided.

(b) Minimum physical restraint of poultry for examination, collection of samples, and a variety of other clinical and experimental manipulations can be accomplished manually or through any device suitable in size and design for the poultry being held and operated properly to minimize stress and avoid injury to the poultry.

(c) Prolonged restraint of any poultry should be avoided unless essential to the research objectives.

(d) Following points should be considered during handling and restraining poultry:

i. Poultry should be handled by competent individuals trained in methods that cause minimal distress and injury.

ii. The use of restraint devices only for larger birds (if any) is sometimes essential for the welfare of the birds and safety of the handler.

iii. Restraint devices should be used to the minimum extent, for the minimum period required to accomplish the objectives and purpose of the experiment and be appropriate for the poultry.

(e) **The following are important guidelines for the use of restraint equipments:**

i. Poultry to be placed in restraint devices should be given training to adapt to the equipment, prior to initiation of the experimentation.

ii. Birds cannot dissipate heat through their skin as a result of which they can become stressed and easily overheated with prolonged resistant.

iii. Provision should be made for observation of the poultry at appropriate intervals. Veterinary care should be provided if symptoms or illness associated with restraint are observed. The presence of illness, or severe behavioural change should be dealt with by temporary or permanent removal of the poultry from restraint related protocol.

27. TRANSPORT OF POULTRY

(a) The transport of poultry from one place to another must be undertaken with care. The main considerations for transport of poultry are: mode of transport, type of containers, bird size, and bird density in cages, food and water during transit, protection from transit infections, injuries and stress.

(b) The mode of transport of poultry depends on the distance, seasonal and climatic conditions and the species of birds. Poultry can be transported by road, rail or air taking into consideration of above factors. In any case the transport stress should be avoided and the containers should be of an appropriate size to enable the birds to have a comfortable movement and protection from possible injuries. Sometimes injuries can be avoided by reducing space and decreasing time of transportation. The food and water should be provided in suitable containers or in suitable form to ensure that they get adequate food and more particularly fluids during transit. The transport containers

(cages or crates) should be of appropriate size and only a permissible number of birds should be accommodated in each container to avoid overcrowding and infighting. **(Annexure – 1)**

28. ANAESTHESIA AND EUTHANASIA

(a) The investigators should ensure that the procedures, which are considered painful, have to be performed under appropriate anaesthesia as recommended for each species of poultry.

(b) It must also be ensured that the anaesthesia is given for the full duration of procedure and at no stage the bird is conscious to perceive pain. If at any stage during the experiment the investigator feels that he has to abandon the experiment or he has inflicted irreparable injury, the bird should be humanely sacrificed. Neuromuscular blocking agents must not be used without adequate general anaesthesia.

(c) In the event of a decision to sacrifice a bird or termination of an experiment or otherwise, an approved method of euthanasia **(Annexure – 11)** should be adopted. The investigator must ensure that the bird is clinically dead before it is sent for disposal. The data of all the birds, that have been euthanized, should be maintained.

I. **Anaesthesia**: Commonly used Anaesthesia along with doses recommended for poultry/birds is provided in **Annexure – 10**.

(a) Unless contrary to the achievement of the results of study, sedatives, analgesics and anaesthetics should be used to control pain or distress under experiment. Anaesthetic agents generally affect cardiovascular, respiratory and thermo-regulatory mechanism in addition to central nervous system.

(b) Before using actual anaesthetics the birds are prepared for anaesthesia by overnight fasting and using pre-anaesthetics, which block parasympathetic stimulation of cardio-pulmonary system and reduce salivary secretion. Atropine is most commonly used anti-cholinergic agent. Local or general anaesthesia may be used, depending on the type of surgical procedure. The fasting period for birds depends on the size of birds. For small birds such as finches, a fasting period less than 2 hrs is adequate. Fasting of birds prior to anaesthesia and surgery has been controversial arguments against fasting time from a concern that fasted birds may become hypoglycaemic because of their high metabolic rate and poor hepatic glycogen storage. The process to hold a bird off feed long enough for the upper gastro intestinal tract to empty is usually overnight in large birds and 4 to 6 hours in smaller birds.

(c) Local anaesthetics are used to block the nerve supply to a limited area and are used only for minor and rapid procedures. This should be carried out under an expert supervision for regional infiltration of surgical site, nerve blocks and for epidural and spinal anaesthesia.

(d) A number of general anaesthetic agents are used in the form of inhalants. General anaesthetics are also used in the form of intravenous or intra-muscular injections such as barbiturates. Species characteristics and variation must be kept in mind while using an anaesthetic. Side-effects such as excess salivation, convulsions, excitement and

disorientation should be suitably prevented and controlled. The birds should remain under veterinary care till it completely recovers from anaesthesia and postoperative stress.

II. **Euthanasia**

Euthanasia should be resorted to events where a bird is required to be sacrificed to reduce suffering or to limit spread of infections or for termination of an experiment or for other ethical reasons. The procedure should be carried out quickly and painlessly in an atmosphere free from fear or anxiety. For accepting an euthanasia method as humane it should have an initial depressive action on the central nervous system for immediate insensitivity to pain. The choice of a method will depend on the nature of study, the kind of bird to be killed **(Annexure – 11)**. The method should in all cases meet the following requirements:

(a) Death, without causing anxiety, pain or distress with minimum time lag phase.
(b) Minimum physiological and psychological disturbances.
(c) Compatibility with the purpose of study and minimum emotional effect on the operator.
(d) Location should be separate from bird rooms and free from environmental contaminants.
(e) Ensure that all individuals responsible for euthanasia:

- Are appropriately trained to perform the procedure.
- Select the method of euthanasia based on the species and the objectives of the protocol.
- Minimize distress to the birds as well as to the operator by handling the bird gently and carefully.
- Avoid the euthanasia of birds in the presence of other birds and/or animals.
- Verify death prior to disposal of the body. Confirm by:
- Observing for the absence of movement.
- Observing for the absence of respiratory and heartbeat activity for at least 3 minutes.
- Check eye reflex.

29. ETHICS

All scientists working with poultry/birds must have a deep ethical consideration for them. From the ethical point of view, it is important that such considerations are taken care at the individual level, at institutional level. Interaction amongst people working in poultry house should be organised periodically to discuss ethical issues favouring wellbeing of poultry and birds.

30. TRANSGENIC BIRDS

Transgenic birds are those birds, into whose germ line the foreign gene(s) have been engineered, whereas knockout birds are those whose specific gene(s) have been disrupted leading to loss of function. These birds can be bred to establish transgenic birds strains. Transgenic birds are used to study the biological functions of specific genes, to develop bird models for diseases of humans or animals, to produce therapeutic products, vaccines and for biological screening, etc. These can be either developed in the laboratory or procured for R&D purpose from registered scientific/academic institutions or commercial firms, generally from abroad with approval from appropriate authorities.

I. MAINTENANCE

Housing, feeding, ventilation, lighting, sanitation and routine management practices for such birds are similar to those for the other birds of the species as given in guidelines. However, special care has to be taken with transgenic/gene knockout birds where the birds can become susceptible to diseases where special conditions of maintenance are required due to the altered metabolic activities. The transgenic and knockout birds carry additional genes or lack genes compared to the wild population. To avoid the spread of the genes in wild population, care should be taken to ensure that these are not inadvertently released in the wild to prevent cross breeding with other birds. The transgenic and knockout birds should be maintained in clean room environment or in bird isolators.

II. DISPOSAL

The transgenic and knockout birds should be first euthanized and then disposed off as described elsewhere in the guidelines. A record of disposal and the manner of disposal should be kept as a matter of routine.

31. BREEDING AND GENETICS

For initiating a colony, the breeding stock must be procured from established breeders or suppliers ensuring that genetic makeup and health status of bird is known. In case of an inbred strain, the characters of the strain with their gene distribution and the number of inbred generation must be known for further propagation. The health status should indicate their origin, e.g. conventional, Specific Pathogen Free (SPF) or transgenic, gnotobiotic or knockout stock.

ANNEXURE – 1

SPECIFICATIONS FOR TRANSPORT OF POULTRY BY ROAD, RAIL AND AIR

Containers used to transport poultry shall be make of such material which shall not collapse or crumble and they shall be well ventilated and designed to protect the health of poultry by giving it adequate space and safety. The containers shall be designed as to render it impossible for birds to crowd into the corners during transportation, and to avoid the danger of boxes being stocked so close together as to interfere with ventilation. The minimum floor space per bird and the dimensions of the containers for transporting poultry shall be as per following table.

Table: Floor space requirement for transportation of poultry

Kind of poultry	Minimum floor space (cm^2)	Dimensions			Number in a container
		Length (cm)	Width (cm)	Height (cm)	
One month old chickens	75	60	30	18	24
Three month old chickens	230	55	50	35	12
Adult stock (excluding geese and turkeys)	550	115	50	45	12
Geese and turkey	900	120	75	75	10 young
	1300	75	35	75	2 growing
	1900	55	35	75	1 grown up
Chicks	--	60	45	12	80
Poultry	--	60	45	12	60
Source: Patel, B H M, Prasanna S B and Mahadevappa D Gouri.2015. Animal Welfare and Management. New India Publishing Agency, India.pp. 181.					

ANNEXURE – 2

HAEMATOLOGICAL DATA OF POULTRY

	Chicken	Duck	Turkey	Quail	Pigeon	Guinea fowl	Emu	Ostriches
RBC(x10 /mm³)	1.3-4.5	2.3-3.5	1.29	2.16	3.1-4.5	2.65	2.4-4.5	2.5-4.5
PCV(%)	23-55	30-43	38.6	30.62	38-50	40.8	39-57	41-57
Hb(g/dl)	7.0-18.6	7-16.5	10.7	10.09	9-15	14.2	13-17	13-18
WBC(X10³/mm³)	9-32	4.5-13	16-25	12.5-24.6	13-23	22.4	8-21	10-24
Heterophils (%)	15-50	30-70	29-52	25-50	50-60	16.5	41-77	55-85
Lymphocytes(%)	45-70	20-65	35-48	50-70	20-40	79.7	17- 48	12-41
Eosinophils(%)	1-6	0-4	0-5	0-15	0-3	2.2	0 -1	0-3
Monocytes(%)	1-7	0-3	3-10	0-4	0-3	1.0	0-1	0-2
Basophils(%)	1-5	0-5	0-9	0-2	0-3	1.1	0-4	0-4

Poultry: Chickens, turkeys, guinea fowl, ducks, geese, quails, pigeons, pheasants, partridges, and emus reared or kept in captivity.

ANNEXURE – 3

SERUM BIOCHEMICAL DATA OF POULTRY

	Chicken	Duck	Turkey	Quail	Pigeon	Guinea fowl	Ostriches	Emu
Protein (g/dl)	3.0-4.9	2.5-6	4.5-6.6	3.2-4.0	2-5.5	3.3-4.1	2.5-5.2	2.5-5.6
Albumin (g/dl)	3.28 - 3.48	17-22	1.4-1.8	0.8-1.0	1-3-2-2	2.0-2.50	1.1-2.3	1.1-2.4
Globulin (g/dl)	1.15 - 1.53	35-60	2.9-4.7	2.4-3.0	1.93-2.16	2.2-2.6	1.4-3.1	1.4-3.1
Glucose (mg/dl)	197 -299	150-300	159-176	135-345	100-250	185-255	164-330	101-243
Urea (mg/dl)	4.46 - 4.54	1.16-1.85	3.7-5.6	2-2.5	4-7	3.7-42	2.5-5.0	2-7
Uric acid (mg/dl)	1.9-12.5	2.1-11.5	1.8-6.4	4-16	3.5-12	2.9-5.1	6.5-14.5	5.3-15
Creatinine (mg/dl)	0.88 - 0.95	0.1-0.5	0.64-0.79	0.3-0.50	0.50-0.85	0.44-0.86	0.1-0.7	0.1-0.4
Cholesterol (mg/dl)	129-297	145-275	168-185	186-225	147-173	112-186	39-172	68-170

ANNEXURE – 4

I. INSTITUTIONAL BIO-SAFETY COMMITTEE (IBSC)

(a) Institutional Bio-safety Committee (IBSC) is to be constituted in all organizations engaged in genetic engineering research and production activities. The Committee will constitute the following:-

(i) Head of the institution or his nominee

(ii) 3 or more scientists engaged in DNA work or molecular biology with an outside expert in the relevant discipline.

(iii) A member with medical qualification-Biosafety officer (in case of work with pathogenic agents/large scale used.)

(iv) One member nominated by DBT

(b) The Institutional Biosafety Committee shall be the point for interaction within institution for implementation of the guidelines. Any research project which is likely to have biohazard potential (as envisaged by the guidelines) during the execution stage or which involve the production of either micro-organisms or biologically active molecules that might cause biohazard should be notified to ISBC. ISBC will allow genetic engineering activity on classified organisms only at places where such work should be performed as per guidelines. Provision of suitable safe storage facility of donor, vectors, recipients and other materials involved in experimental work should be made and may be subjected to inspection on accountability.

II. The Bio-safety functions and activity include the following:

(a) Registration of Bio-safety Committee membership composition with RCGM and submission of report. ISBC will provide half yearly reports on the ongoing projects to RCGM regarding the observance of the safety guidelines on accidents, risks and on deviations if any. A computerized Central Registry for collation of periodic reports on approved projects will be setup with RCGM to monitor compliance on safeguards as stipulated in the guidelines.

(b) Review and clearance of project proposals falling under restricted category that meets the requirements under the guidelines. IBSC would make efforts to issue clearance certificates quickly on receiving the research proposals from investigators.

(c) Tailoring bio safety program to the level of risk assessment.

(d) Training of personnel on bio safety.

(e) Instituting health monitoring program for laboratory personnel Complete medical check up of personnel working in projects involving work with potentially dangerous microorganism should be done prior to starting such projects. Follow up medical check-ups including pathological test should be done periodically, at annually for scientific workers involved in such projects. Their medical record should be accessible to the RCGM. It will provide half yearly reports on the ongoing projects to RCGM regarding the observance of the safety guidelines on accidents, risks and on deviations if any.

(f) 3 Adopting emergency plans.

ANNEXURE – 5

Table1: Floor, feeder and water space requirements for Turkeys, Ducks, Geese, pheasant, Guinea fowl and Emu

Age/System	Turkey (large)	Ducks	Geese	Pheasant	Guinea Fowl	Emu
Floor Space (cm^2/bird)						
Hover space	30	30	35	25-50	25-50	1350
0-4 week	1350	720	1350	900	450	7200
4-8 week	1800	1350	1800	1800	720	13500
8-12 week	2700	1800	2700	2700	900	27000
>12 week	4500	2700	4500	2700	1350	54000
Adult	7200	4500-5400	7200	2700	1350-2700	0.04 – 0.12*
Cage	2500	----	----	387-645	387-644	----
Feeder Space (cm/bird, linear)						
0-1 week	3.0	5.0	5.0	1.5	1.5	10
1-2 week	6.25	5.0	6.25	2.5	2.5	15
2-4 week	7.5	6.25	7.5	3.75	2.5	22.5
4-8 week	10.0	6.25	10.0	5.0	3.75	22.5
>8 week	12.5	7.5	12.5	7.5	6.25	22.5
Adult	15.0	12.5	15.0	7.5	10.0	22.5
Waterer Space (cm/bird, linear)						
0-1 week	2.5	1.75	1.75	0.75	1.25	15
1-4 week	2.5	1.75	2.5	1.25	1.25	15
4-8 week	2.5	1.75	2.5	1.50	1.25	15
>8 week	3.0	2.0	3.0	2.50	2.00	15
Adult	3.5	2.5	3.5	2.50	2.50	15

** In hectare (ha) for 2 to 4 birds*

Source: Sreenivasaiah, P. V. (2006): In Scientific Poultry Production. 3rd Ed., International Book Distributing Co., India. pp.835-836

Table 2: Floor, feeder and waterer space requirements of chicken (per bird) in all litter system

Type	Floor space, cm^2			Feeder space, cm		Waterer space, cm		
	Brooder	Grower	Layer	Grower	Layer	Brooder	Grower	Layer
Standard Leghorn								
Egg type	700	900 (1400*)	1400	6.4	8.75	1.50	1.90	2.50
Breeder pullets	790	1600	1900	6.4**	9.40			
Breeder cockerels	930	1600	1900	7.6	9.40			
Medium size								
Egg type	790	1100 (1600*)	1600	7.6	10.5	2.20		
Breeder pullets	930	1800	2100	7.6**	10.6			
Breeder cockerels	930	2000	2100	8.9	10.6			
Meat type								
Breeder pullets	930	2300	2800	15.0**	15.0	1.9	2.5*	3.1
Breeder cockerels	1160	2800	2800	20.0	15.0	2.5	3.2*	
Broilers*								
1.36kg	500					2.0****		
1.82kg	600							
2.27kg	800							
2.72kg	900							
3.18kg	1100							

* up to 22 weeks
** for straight-run flock
*** decrease floor space by 10% during winter
**** up to 8 weeks, 2.8 cm for roasters. For broilers, feeder space required is 5.0 cm upto 5 weeks, 7.6 cm up to market (7 weeks); for all others, 5.0 cm.
All feeder and waterer space are in linear cm; in case of circular feeder and waterer, 20-30% extra birds can be fed and watered, respectively.
Source: North and Bell, 1990

Table 3: Floor, feeder and waterer space of chicken (per bird) in cage system

Parameters & Type		Std. leghorn	Medium size
Floor space (cm^2/bird)	B	155	181
	G	290	348
	L	389	452
Feeder space (cm/bird)	B	5.1	5.6
	G	4.1	6.9
	L	7.6	8.4
Waterer space (cm/bird)	B	1.9	2.0
	G	2.5	3.1
	L	3.8	4.3
Pullets/nipple	B	15	12
	G	10	8
	L	8	6
Pullets/cup	B	25	19
	G	15	13
	L	12	10
B: Brooding (0-5 weeks); G: Growing (6-18 weeks); L:Laying (>18 weeks) Source: Sreenivasaiah, P. V. (2006): In Scientific Poultry Production. 3rd Ed., International Book Distributing Co., India. pp.837			

Table 4: Floor space (cm^2/bird) for chicken under different systems of rearing

Type	Standard Leghorn	Medium size	Standard Meat type
Layers			
Slat and litter*	1200	1400	--
Wire and litter*	1200	1400	--
All slat	900	1200	--
All wire	900	1200	--
Breeders			
Slat / Wire and litter*	1600	1900	2300
All slat	1200	1400	1900
All wire	1200	1400	1900
* 40% litter and 60% slats Source: North and Bell, 1990			

Table 5: Cage dimensions (cm) for chicken

Type	Width	Depth	Birds	Height	Welded wire with mesh size	Slope
Brood-cum-grow cages	55.9	61.0	--	35.6-40.6	1.3x5.1 or 2.5x2.5, 14 gauge; if more than 1.25cm, cover with paper during first 2 weeks	NIL
	61.0	61.0				
	61.0	68.6				
	61.0	91.4				
Laying*	25	41	2	40.6	2.5x5.0; uppermost wire at right angles to length of the house or from back to front of the cage	4.1 for each 30.5 cm of depth; 7.66^{o}
	31	41	3			
	31	46	4			
	31	51	4			
	36	41	4			
	36	46	5			
	41	46	6			
	41	51	6			
	61	46	7			
	61	91	15			
	91	122	30			
*Feeder/Waterer space: 12.7to15.3 cm/bird Source: North and Bell, 1990						

Table 6: Brooding temperature (^{o}C) for different categories of poultry species

Species	**1-2d**	**3-7d**	**2nd week**	**3rd week**	**4th week**
Chicken, Quail, Guinea fowl	35.0 - 37.7*	35	32.2	29.4	23.9 to 26.6
Poults	37.7	36	32.2	28.3	24.4
Ducklings	29.0-32.0	26.0 - 29.0	23.0-26.0	--	--
Gooslings	32.0	29.0	22.0		
* Whole house start at 33^{o}C; then 29^{o}C after 12 hr Source: Sreenivasaiah, P. V. (2006): In Scientific Poultry Production. 3rd Ed., International Book Distributing Co., India. pp.602					

Table7: Temperature, Relative Humidity, Floor space, Feeder space and Water space requirements of Japanese Quail

Item	Chicks (0-3 week)	Grower (4-5 week)	Adult (<6 week)
Temperature (^oC)	37-38	21-22	21-22
R.H. (%)	60-65	55-60	55-60
Floor space (sq. cm)	100-140	140-160	180-200
Feeder space (linear cm)	2	2.5	3
Water space (linear cm)	1	1.5	2

Source: Raj Narayan (2017). Social impact in intensively reared Japanese Quails. In: Stress and Welfare: Concept and Strategies for Addressing Current Challenges in Poultry Production (Eds.: Bhanja, S. K., Rokade, J. J., Kolluri, G. And Gopi, M.). ICAR-Cenral Avian Research Institute, Izatnagar, India. pp. 267-280.

ANNEXURE – 6

Thermo-neutral zone for poultry is 10-20^{o}C and ideal temperature is about 15^{o}C. Temperature from 5 to 10^{o}C and from 20-25^{o}C are also acceptable as comfortable zone. Above 30^{o}C temperature, heat stress begins on poultry and requires cooling measures. Upper lethal temperature for poultry is 47^{o}C. Practically, poultry house should maintain a temperature of 20^{o}C -25^{o}C with an RH of 40-60%. However, temperature of shed may vary as per age / type of poultry as given below.

Table 1: Recommended temperature range and ventilation for different categories of poultry

Type of Poultry	Temperature (^{o}C)		Rate of flow (m^3/min)		
	Range	Recommended	Minimum	Recommended	Maximum
Chicks	30-35	30-35	0.0014	0.0014	0.0014
Pullets	20-30	20-30	0.0014	0.0284	0.1136
Layers in cages	10-30	18-21	0.0142	0.1846	0.2130
Layers in litter	10-30	18-21	0.0142	0.1136	0.1400
Breeders	10-30	18-21	0.0142	0.1420	0.1704
Broilers (litter)	10-30	20-22	0.0142	0.0284	0.1136
Turkeys	10-21	20-22	0.0142	0.0620/kg	0.0775/kg
Note: relative humidity should be within the range of 50 and 75%					
Sreenivasaiah, P. V. (2006): In Scientific Poultry Production. 3rd Ed., International Book Distributing Co., India. pp.507					

ANNEXURE – 7

Table 1: Ventilation rates in poultry

Stock	Age (d)	Weight (kg)	Maximum		Minimum	
			M^3/min/bird	Fans*	M^3/min/bird	Fans*
Pullets and layers including breeders		1.8	0.138	0.9	0.0150	0.10
		2.0	0.150	1.0	0.0162	0.11
		2.2	0.162	1.1	0.0174	0.12
		2.5	0.180	1.2	0.0192	0.13
		3.0	0.204	1.4	0.0216	0.15
		3.5	0.228	1.5	0.0246	0.16
Broilers	7	0.17	0.186	1.3	0.0024	0.02
	14	0.43			0.0048	0.03
	21	0.80			0.0084	0.05
	28	1.25			0.0114	0.08
	35	1.74			0.0144	0.10
	42	2.23			0.0174	0.12
	49	2.68			0.0198	0.13
Turkeys		0.5	0.054	0.4	0.0060	0.04
		2.0	0.150	1.0	0.0162	0.11
		5.0	0.300	2.0	0.0318	0.21
		10.0	0.504	3.4	0.0540	0.36

**61cm diameter fans/1000 birds (900 rpm and 70 Pa static pressure)*
Source: Sreenivasaiah, P. V. (2006): In Scientific Poultry Production. 3rd Ed., International Book Distributing Co., India. pp.846.

Table 2: Typical air flow requirement at 30-60% relative humidity

Temperature (°C)	Air flow (m^3/min/kg body weight)
15.6	0.045
26.7	0.060
37.8	0.075
43.3	0.083

Source: North, M.O. and Bell, D.D.1990. Commercial chicken production manual. The AVI Publishing Company, Inc.

ANNEXURE – 8

Table1: Specification for light

Requirement		**0-2d**	**2d-2 wk**	**2-10 wk**	**10-20 wk**	**Layer or breeder**
Chicken	**Egg-type**	24h, 2.8w/m^2	23h, 2.8w/m^2	Natural or <12h	Decreasing or 8h	15h, 10.76 lx or add 15 min/wk
	Meat-type	24h, 2.8w/m^2	23h, 2.8w/m^2	Natural or <12h	Decreasing or 8h	16h, 32.28 lx or add 15 min/wk
Turkey (large)		24h, 2.8w/m^2	23h, 2.8w/m^2	Natural or <12h	Decreasing or 8h	16h, 53.8 lx or add 15 min/wk
Ducks		24h, 10w	23h, 10w	Natural	Natural	15h, 10.76 lx or add 15 min/wk
Geese		24h, 10w	23h, 10w	Natural	Natural	15h, 10.76 lx or add 15 min/wk
Pheasant		24h, 1.1w/m^2	Natural or <12h	Natural or decreasing	Natural or decreasing	17h, 53.8 lx or add 30 min/wk
Quail		24h, 1.1w/m^2	Natural or <12h	Natural or decreasing	Natural or decreasing	17h, 53.8 lx or add 30 min/wk
Guinea Fowl		24h, 1.1w/m^2	Natural or <12h	Natural or decreasing	Natural or decreasing	16h, 53.8 lx or add 15 min/wk
Emu		24h, 1.1w/m^2	Natural	Natural	Natural	Natural

W=J/s lux (lx)=0.0929 foot candle (fc)

Source: Sreenivasaiah, P. V. (2006): In Scientific Poultry Production. 3rd Ed., International Book Distributing Co., India. pp.843-844

ANNEXURE – 9

Table 1: Requirements for chicken Feeds
(Clauses 4.1.2, 7.1, E-4.2 and E-5)

Characteristic	Requirement for														
	Broiler Feed			Layer Feed				Broiler Breeder Feed				Layer Breeder Feed			
	Pre-starter	starter	Finisher	Chick	Grower	Layer Phase I	Layer Phase II	Chick	Grower	Layer	Male	Chick	Grower	Layer	Male
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Moisture, Percent by mass, Max	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Crude protein (N * 6.25), percent By mass, Min	22.5	21.0	19.5	20.0	16.0	18.0	16.0	20.0	16.0	16.0	14.0	20.0	16.0	17.0	16.0
Ether extract, percent by mass, Min	3.0	3.5	4.0	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
Crude fibre, percent by mass, Max	5.0	5.0	5.0	7.0	9.0	9.0	10.0	7.0	9.0	9.0	9.0	7.0	9.0	9.0	9.0
Acid insoluble ash, percent by mass, Max	2.5	2.5	2.5	4.0	4.0	4.0	4.5	4.0	4.0	4.0	4.0	2.5	2.5	2.5	2.5

Salt (as NaCl), percent by mass, Max	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Table 2: Requirements for Chicken Feeds

(Clauses 4.1.2 and 7.1)

Characteristic	Requirement for														
	Broiler Feed			Layer Feed				Broiler Breeder Feed				Layer Breeder Feed			
	Pre-starter	starter	Finisher	Chick	Grower	Layer Phase I	Layer Phase II	Chick	Grower	Layer	Male	Chick	Grower	Layer	Male
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Calcium (as Ca), Percent by mass, Min	1.0	1.0	1.0	1.0	1.0	3.8	3.8	1.0	1.0	3.5	1.0	1.0	1.0	3.8	1.0
Total phosphorus, percent by mass, Min	0.8	0.75	0.70	0.7	0.65	0.65	0.65	0.7	0.7	0.7	0.7	0.65	0.6	0.6	0.6
Available phosphorus, percent by mass, Min	0.48	0.46	0.44	0.45	0.40	0.40	0.40	0.45	0.45	0.40	0.40	0.45	0.40	0.40	0.40
Lysine, percent by mass, Min	1.3	1.2	1.0	1.0	0.7	0.7	0.65	1.0	0.8	0.85	0.8	0.95	0.7	0.7	0.8
Methionine, percent by mass, Min	0.5	0.5	0.45	0.4	0.35	0.35	0.3	0.45	0.4	0.45	0.4	0.4	0.4	0.4	0.4

Metabolizable energy (Kcal/kg), Min	3000	3050	3100	2800	2500	2600	2400	2800	2650	2700	2750	2800	2600	2600	2600
Aflatoxin B1 (ppb), max	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50

Table 3: Requirements for Minerals, Vitamins, Amino Acids and Fatty Acids per kg of Chicken Feeds

(Clauses 4.1.3 and 7.1)

Characteristic	Requirement for														
	Broiler Feed			Layer Feed				Broiler Breeder Feed				Layer Breeder Feed			
	Pre-starter	Starter	Finisher	Chick	Grower	Layer Phase I	Layer Phase II	Chick	Grower	Layer	Male	Chick	Grower	Rom	Male
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Manganese, mg/kg, Min	100.0	100.0	100.0	70.0	60.0	60.0	60.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Iodine, mg/kg, Min	1.2	1.2	1.2	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Iron, mg/kg, Min	80.0	80.0	80.0	70.0	60.0	60.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Zinc, mg/kg, Min	80.0	80.0	80.0	60.0	60.0	60.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Copper, mg/kg, Min	12.0	12.0	12.0	12.0	9.0	9.0	9.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Selenium, mg/kg, Min	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.20	0.15	0.15	0.15	0.20	0.15
Vitamin A, IU/kg, Min	11.000	11.000	11.000	9.000	8.000	8.000	8.000	12.000	12.000	15.000	12.000	12.000	12.000	15.000	12.000
Vitamin D_3, IU/kg, Min	3.000	3.000	3.000	1.800	1.600	1.600	1.600	2.500	2.500	3.000	2.500	2.500	2.500	3.000	2.500
Vitamin B_1, mg/kg, Min	2.5	2.5	2.5	2.0	1.5	1.5	1.5	2.0	2.0	3.0	2.0	2.0	2.0	3.0	2.0
Vitamin B_2, mg/kg, Min	6.0	6.0	6.0	6.0	5.0	7.0	7.0	5.0	5.0	6.0	5.0	5.0	5.0	6.0	5.0
Pantothenic acid, mg/kg, Min	15.0	15.0	15.0	10.0	9.0	9.0	9.0	15.0	15.0	25.0	15.0	15.0	15.0	25.0	15.0
Niacin, mg/kg,	40.0	40.0	40.0	40.0	20.0	20.0	20.0	40.0	40.0	50.0	40.0	40.0	40.0	50.0	40.0

Min															
Biotin, mg/kg, Min	0.15	0.15	0.15	0.10	0.10	0.10	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Vitamin B_{12}, mg/kg, Min	0.015	0.015	0.015	0.010	0.008	0.008	0.008	0.025	0.025	0.030	0.025	0.025	0.025	0.030	0.025
Folic acid, mg/kg,Min	1.0	1.0	1.0	1.0	0.50	0.50	0.50	3.0	3.0	4.0	3.0	3.0	3.0	4.0	3.0
Choline, mg/kg, Min	500.0	500.0	500.0	500.0	200.0	400.0	400.0	850.0	850.0	700.0	500.0	850.0	850.0	700.0	500.0
Vitamin E, mg/kg, Min	30.0	30.0	30.0	15.0	10.0	10.0	10.0	20.0	20.0	50.0	20.0	20.0	20.0	50.0	20.0
Vitamin K_3, mg/kg, Min	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	3.0	2.0	2.0	2.0	3.0	2.0
Vitamin B_6, mg/kg, Min	5.0	5.0	5.0	3.0	3.0	3.0	3.0	5.0	5.0	6.0	5.0	5.0	5.0	6.0	5.0
Linoleic acid, percent byMass, Min	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

NOTES (Applicable for Tables 1, 2 & 3)

1. The values specified for characteristics at SI No. (ii) to (vi) are on dry matter basis. IS 14828 shall be the referee method, in case of dispute, HPLC method shall be the referee method.
2. Earlier the broiler cycle was for eight weeks. It has now reduced to 6 weeks. The split was therefore 0 to 3 weeks starter and 4 to 6 weeks finisher. The starter period is further split into pre-starter 0 to 10 days and starter 11 to 21 days. This optimizes the performance. Therefore, it is advised that Pre-starter Feed to be used from 1 to 10 days. Starter feed from 11 to 21 days and Finisher feed from 22 days to finish.
3. An expected broiler performance as on current status is given in Table 8 and 9. It must be noted that the performance parameters may change with the input of high genetic material in future. These values are applicable as on current basis and may only be viewed as guidelines.
4. It has been observed that with the increasing usage of essential amino acids such as lysine, methionione, threonine, tryptophan and arginine the need for high protein has come down significantly. This has resulted into lowering of protein content in the poultry feedsand environment friendly poultry production.

5. The energy values of broiler feeds have been increased as compared to existing Indian standards, because of current FCR of 1.60 as compared to previous 2.2 at market age. The feed being manufactured now-a-days is denser with high energy and is mostly in crumble/pellet form.
6. Ether extracts means all ether soluble materials which include oil, alcohol, cholesterol, pigments waxes, fat soluble vitamins etc. Since the method for estimation exclusively for oil is not available ether extract connotation is being used.
7. In earlier days, use of methionine and choline in feeds was limited. Their incorporation has gone up and since both help as lipolytic factors, it is felt that the role of biotin has been limited, hence the biotin values have been reduced compared to existing Indian standards.
8. Egg type starting chick stage is 0 to 8 weeks. Grower stage is 9 to 18 weeks of age. Phase I is from 19 weeks to 40 weeks and phase II is from 41 weeks to 80 weeks of age of bird. The Ca concentration may be increased to 2.0 % during 16 -18 weeks of age and be used as pre-layer feed. It is therefore advised to use the respective feeds accordingly.
9. Phase I and phase II in layer cycle is necessary because there are changes in production, egg size, requirement of calcium, efficiency of digestion, age, etc.
10. Top dressing of extra calcium source in the form of shell grit/limestone at about 2-3 g per bird per day is advised during laying phase.
11. The expected performance of layers has been furnished in Table 9. Which may be used as guideline depending upon the present genetic potential of the bird?
12. It is advised to use starting chick feed from 0-4 weeks, grower feed from 5-22 weeks for broiler breeders. The layer breeders will be fed starter feed from 0-4 weeks and grower feed from 5-19 weeks of age. The Ca concentration may be increased to 2.0 % during 20 -22 weeks of age for broiler breeders and 15 -18 weeks to layer breeders as pre-layer feed. It is therefore advised to use the respective feeds accordingly.

Table 4: Maximum Prescribed Limit for Harmful Substances and Test Methods in Compound Poultry Feeds

(Clauses 4.1.4, E-2.3 and E-3.1)

Sl No	Substance	Max content, Referred into a Moisture Content of 11 percent	Methods of test ref to	
			IS	AOAC
(1)	(2)	(4)	(5)	
i)	Arsenic	2 ppm	A-6 of IS 1767	AOAC 957.22
ii)	Fluorine	30 ppm	Annex B of IS 5470	AOAC 975.08
iii)	Lead	5 ppm	A-7 of IS 1767	AOAC 999.11
iv)	Mercury	Absent	-	AOAC 971.21, 2015.01
v)	Nitrite (Na nitrite)	15 ppm	-	AOAC 968.07
vi)	Aflatoxin B_1	50 ppb	IS/ISO 14718	AOAC 972.26, 975.36
vii)	Free gossypol	20 ppm	IS/ISO 6866	-
viii)	Hydrocyanic acid	10 ppm	-	AOAC 970.11, 915.03
ix)	BHC	20 ppb	IS 15950	AOAC 970.52
x)	DDT	55 ppb	IS 15950	AOAC 970.52
xi)	Endosulphan	10 ppb	IS 15950	AOAC 976.23
xii)	Aldrin	1 ppb	IS 15950	AOAC 970.52

Note — Indian Standards referred wherever shall be the referee method in case of dispute.

ANNEXURE – 10
COMMONLY USED ANAESTHETIC AGENTS FOR BIRDS

Drug (mg/Kg)	Birds
Ketamine Hcl	10-50mg/kg IM
Pentobarbitone Sodium	25-30 mg/kg IV
Ketamine+Xylazine	40+10mg/kg IM 2.5-+0.25-0.5mg/kg IV
Diazapam	0.5mg IM, IV
Propfol	0.3-0.4mg/kg/minute
Isoflurane	3-5% induction 0.5-2% maintenance

ANNEXURE-11

EUTHANASIA OF POULTRY

(A – Methods Acceptable NR – Not Recommended)

IP = Intra Peritoneal, IV= Intra Venous

Species	**Chicken**	**Duck**	**Turkey**	**Guinea fowl**	**Quail**
a) **PHYSICAL METHODS**					
Cervical dislocation	A	A	A	A	A
Decapitation	A	A	A	A	A
Exsanguination	A	A	A	A	A
Electrocution	NR	NR	NR	NR	NR
b) INHALATION OF GASES					
Carbon Dioxide	A	A	A	A	A
Carbon Monoxide	A	A	A	A	A
Nitrogen, Argon					
Halothane, Isoflurane, Sevoflurane	A	A	A	A	A
c) **DRUG ADMINISTRATION**					
Barbiturate Overdose (route)	A (IV/IP)	A (IV/IP)	A (IV/IP)	A (IV/IP)	A (IV/IP)
Sodium Pentobarbital Overdose (route)]	A (IV/IP)	A (IV/IP)	A (IV/IP)	A (IV/IP)	A (IV/IP)

Ref: AVMA Guidelines for the Euthanasia of Animals, 2020 Edition

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