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Pig As A Choice For Animal Experimentation

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ABSTRACT

Development of Science and Technology through experimental animals has grown widely in the world, including Indonesia, various studies / experiments that have been carried out shows a very positive results for the benefit and progress of science and technology on the one hand and social welfare on the other hand. Pigs as animal experimentation have contributed and serve as animal choice as a test animal, the pig as a species of mammals have in common with man widely associated cardiovascular system, respiratory system and nervous system including musculo-skeletal system .

Keywords: Studies, Animal model, Experimental Animals, Pig.

Introduction

Animals experimentation actually use in the implementation of research programs are very often in Indonesia, which is much used in applied research and experimental research.

The use of experimental animals in research programs are widely used in various scientific fields such as Biotechnology, Immunology, Pharmacology, Physiology and Experimental Surgery and Applied.

The use of experimental animals as an animal model studies / experiments were performed not by choice regardless of the species, strain, age, sex and health status and what is needed from the animal concerned (Tuffery A.A. 1995; D. Kusumawati. 2004)

The choice of pigs as experimental animals are often used in various studies / experiments through a surgical procedure (Lumley JSP *et al*. 1990).

Pierre Gallix, 1990 and Waynforth H.B. & P.A. Flecknell 1987 said that various studies in the field of surgery are very broad in scope includes:

1. Reconstruction Surgery

   1.1. Reconstruction of the trachea and oesophagus
   1.2. Reconstruction of the digestive tract
   1.3. Reconstruction of the urinary system (urogenital)
   1.4. Cardiac Reconstruction and vascularization
   1.5. Orthopaedic Reconstruction and Plastic / Cosmetic.

2. Transplant Surgery

   2.1. Organ Transplantation, Cell and Tissue
   2.2. Mechanical Organ Harvesting, Storage Organ and Organ Reimplantasi
   2.3. Multi Organ Transplant.

3. Biomaterials and new technologies

   3.1. Studies prototype renewal and modification
   3.2. Study of the renewal application of the products used and the learning function of the products used.

Application Of Study / Experiments Include:

1. Prothese and Implantable Artificial Organs through Biocompatibilitas study, As well as:

   1.1. Prothese cardiac, and vascular valve
   1.2. Artificial pancreas, artificial skin
   1.3. Prothese for Orthopaedic surgery and plastic surgery

2. Support equipment in surgical activity:

   2.1. Circulation equipment extra corporel (heart-lung machine) that provide support late to the circulatory system and respiratory
   2.2. Equipment Anesthesia and Reanimation
   2.3. Dialysis and ultra filtration equipment
   2.4. Laboratory Diagnostic Equipment
   2.5. Diagnostic equipment such as: Magnetic Resonance Imaging (MRI), Sanner, Ultrasonography (USG), X-ray, catheterization for; vascular and Liquide Cephalo-Rachidien (LCR), Urinaire and biliaire. Electrocardiography (ECG), Electroencephalography (EEG).

Location And Study Center For Experimental Animal

The center of animal experimentation is an establish building with adequate facilities for research to address a variety of issues and challenges in the field of science and technology.

The institution building has adequate facilities for academicians to carry out animal experimental activity.

1. Animal Cages, consisting of:

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1.1. Mice with an area of 35 m2 has 120 Boxes
1.2. Rabbit with an area of 35 m2 has 80 Boxes
1.3. Dogs / Cats with a capacity of 40 boxes a '2 m2
1.4. Small Ruminantia (Goats, Sheep, Calf) with a capacity of 20 boxes a '6 m2
1.5. Pigs with a capacity of 20 Boxes a'6 m2

2. Diagnostic Laboratory

Needed to support the activities of study / research conducted to obtain an effective and accurate results from activity studies / experiments performed.

Laboratory instruments required includes laboratory infrastructure in accordance with the standards laboratory requirements.

3. Radiology Laboratory

Have facilities for X-Ray, Scanner, Ultrasound and MRI in addition to facilities for Catheterization, Angiography and Angioplasty transcutan. Besides the necessary means of ECG and EEG.

4. Operating Room

4 blocks Space Operations which includes one block for the Preparation, 1 block for classical operation, 1 block for large operations that are specific such as surgery / Heart, Liver, Kidney, Lung transplant and Orthopaedic and 1 block for microsurgery, all of which are supported with surgical equipment in accordance with the standards.

5. Sterilisator Room

Needed to prepare the infrastructure operations with Autoclave Oven for making sterile clothing, drap, hood, mask, gloves, sterile gauze and bandages, dressings and surgical instruments.

Why The Study And Experimentation With Animals Is Very Necessary

The main purpose of the study is the use of animal experiments in the development of science and technology (Science and Technology) in the field of of Medicine, Biomedical and Pharmaceutical, especially for improving the quality of human life as well as improving the quality of medical technology development through various studies and experiments performed.

The benefits on the use of animals for scientific experimentation are very useful and perceived directly by the scientific community and society in general on the various improvements and new findings in the field of science and technology that become the driving force for the welfare of society.

Productivity is generated as a form of togetherness from various academic disciplines working together in studies / experiments performed, pushing to do the following things:

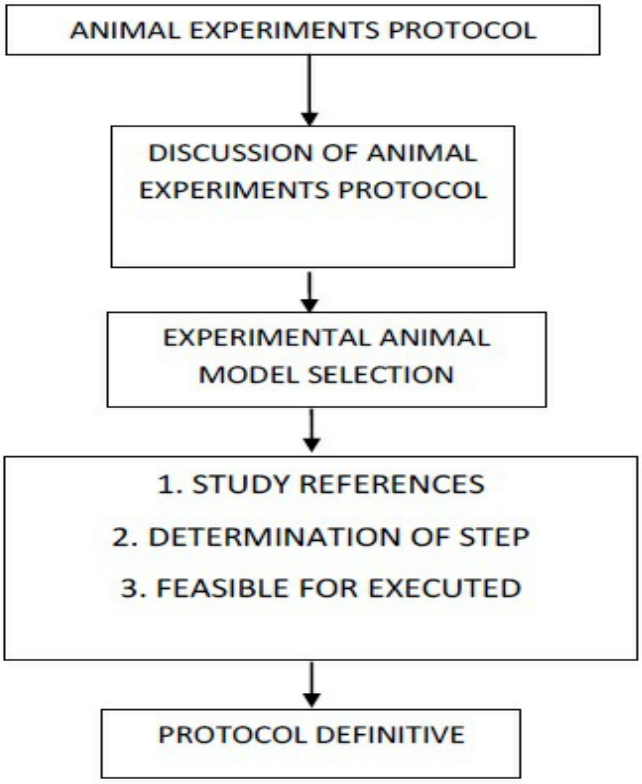
1. Establishment of study / experiment facilities (Center of Laboratory Animal Experimentation) with personnel who have the scientific background of the various disciplines required for the formation according to the study activities / experiments performed.
2. It takes the support of infrastructure and facilities in the study activities / experiments in existing institutions or institutional.
3. It takes the availability of a variety of animal models as an animal that serves as the object of study / experiment performed.
4. Development studies / experiments from previous findings in addition to technology / new study results as an effort to improve the results of the study / Recent experiments as a form of improvement and development of technology.
5. Utilization of various findings as well as the development is done as an institution / scientific institutions by the Academics (Lecturer Faculty / University) in the last year of study, specialist level 1, level 2 and level 3.
6. Utilization of all studies / experiments to be published either in the local-scale scientific journals, national and international.
7. In the spirit of a multi-disciplinary institution, evoking the spirit of science to build a healthy and prosperous society through the development of Science and Technology.

Collaboration Between Discipline Of Science

The success of the study activities / experiments with animal can not be separated from the support shared between different disciplines, especially the clinicians and colleagues from Anatomy and Histology Pathology section, Clinical Pathology / Hematology, Biochemistry, physiology and immunology and Statistics Division provides a real contribution in the various activities of studies / experiments in animal experiments performed.

Step of collaboration is also done by involving the private sector which contributes as public participant, so it appears the chain of continuity between Academia (Center for the Study Centre Try) and Private Entrepreneurs who care and Government / Government which in this case from The University and Local Government.

Scheme Of Studies / Experimental Animal



According A.A. Tuffery, 1995; JSP Lumley et al, 1990; H.B. Waynforth & P.A. Flecknell 2007 that the actual activities of studies / experiments in animals up to now present experimental activities in the field of organ transplant surgery occupy the majority of activities.

As is understood that the nature and effect of Immuno-suppresif of Cyclosporine has been known for more than a dozen years ago, which has provided benefits in the treatment of organ-transplant.

Progress that has been obtained from the administration of this therapy is not only related to the new organ transplant donor organs such as intestinal and pulmonary who have the sensibility to the rejection reaction of the body but also practiced in multi organes like renal- transplant pancreas; heart-lung; liver-pancreas - intestinal.

The success of the experiment in the field of organ transplant surgery can not be separated from the success that has been done in the field of organ transplants through the first experiments on animals that have contributed to the success of organ transplantation in humans to improve the quality of human life is concerned.

This success is inseparable from the success of doing various experiments have been conducted in experimental animals as well as:

1. Surgical technique for organ harvesting in the form of simple or multiple.
2. Technical storage / conserving a good organ to be transplanted with good results.
3. Reimplantasi surgical technique with a good success rate
4. Biopsy technique transplanted organ as a control against which the results of organ transplants performed.
5. Study the deepening associated with the handling Immuno-suppression factor as a success of organ transplants performed.

Why Pig Is Selected As An Animal Model For Experimental Trial

JSP Lumley, 1990 and Gallix P, 1990 stated that the determination of the animal model of choice as experimental animals intended for the purpose of study / experiment performed.

In terms of anatomy and animal body size is very important and as a test animal, the pig as a species of mammals have in common with man cardiovascular system, respiratory system and nervous system including musculo-skeletal system.

As an omnivorous animal group, they must have the same nutrients as nutrition is concerned.

Pigs need 6 essential nutrients that are composed of water, proteins, carbohydrates, fats, minerals and vitamins. The amount of fibrous feedstuffs in swine rations is not more than 5% with good quality as alfalfa leaf meal, grains such as corn, forage serves as vitamins are right quality protein supplement in the form of premix.

Protein quality is reflected from amino acid content, there are 10 kinds of essential amino acids such as arginine, histidine, isoleucine, leucine, lysine, methionin, phenylalanine, tryptophan and valine. Likewise, pig still takes no more than 5% of fat in the feed element.

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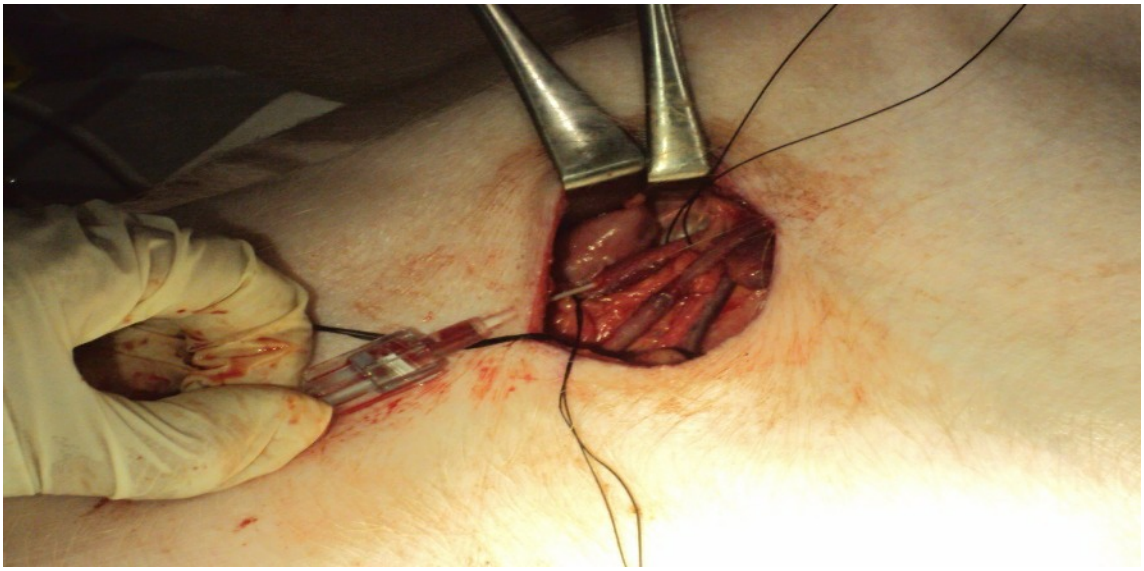
Carbohydrate content is a major component to meet energy needs, TDN known as Total digestible Nutrient used to estimate energy requirements. Metabolizable energy or energy available can also be regarded as a better measure of underlying calculations.

Mineral needs, in addition to salt, calcium (Ca) is a mineral that is most needed by pigs, and as a source of calcium from bone flour, flour milled from the shell. Iodine needs is also necessary for growth, pregnancy and lactation period. Likewise, the need for iron and copper for the formation of hemoglobin and anemia are common in pigs, iodized salt may be added in the feed ration of 0.5%.
Magnesium requirement is needed to control muscle contraction and balance the body, while Phosphorous is needed for the growth and development of the skeleton and Zn is needed for healthy skin and growth, common salt (NaCl) is the most common mineral and is essential that the minimum requirement is 0.2% - 0.5%.

Vitamins A, D, E, K is needed for growth and reproduction as well as vitamin B1, B6 and B12. (JAMES Blakeley and David H. Bade, 1991).

Picture 1: The pig as experimental animals for experimental surgical activities

Picture 2: Catheterization process in the carotid artery of pigs



Picture 3: Installation of a catheter in the carotid arteries of pigs

Catheterization On Pig

Picture 1, 2 and 3 above show the use of pig as experimental animals in the installation of a catheter in the carotid artery through neck surgery in pig.

The study was conducted relates to a ventilator system in Anesthesia Machine system updates.

The decision to use pigs as experimental animals, especially in surgery, contributing to experiments is base on:

1. Pig as a good experimental animals used in surgery program.
2. . Surgical technique in experimental animals pigs make it easy to follow up on the animal from a smaller type
3. Chronic canulation could happen
4. Monitoring For MRI examination, Radiography, Angiography very good.

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5. Can be performed anesthesia with long duration (Fleknell P.A. 1987).

Conclusion

Pigs as an excellent experimental animals used in studies / experiments, especially in relation to surgical technology. Surgical experiments give good results with pigs as experimental animals.

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