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**Innovation In Breeding, Production, And Marketing Of Rattus Norvegicus As The Experimental Animal Laboratory****Aulia Firmawati<sup>\*1</sup>, Dyah Ayu Oktavianie A. Pratama<sup>2</sup>, Gatot Ciptadi<sup>3</sup>**<sup>1,2</sup>Department of Veterinary Public Health,

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[auliafirmawatidrh@yahoo.com](mailto:auliafirmawatidrh@yahoo.com)**ABSTRACT**

*The main problem is availability of animal research (stock) that at any time required by researchers or for practicum purposes. This problem actually can become a good breeding business opportunity for LBioS-UB that can cooperate with FKH-UB as one source of generating income and is very necessary to get independence of LBioS-FKH UB. LBioS has the modern facilities that very adequate to maintenance animal research, while FKH has experienced and competent human resources for breeding, production and provision of experimental animal stock. Based on the Brawijaya University policy, the long-term goals and targets of LBioS-UB should be self-supporting laboratories, especially in administration and finance. The University has provided sufficient facilities/equipment for research and production of biological materials, FKH UB is provide some experimental animals through breeding and producing in accordance with quality standards that have been identified and adjusted with the customer needs. The advantage of animal research produced by LBioS-PKH UB is the existing quality assurance and staff expertise. Promotion will be offered through networking that has been owned by several national/international institutions with website media: [www.biosains.ub.ac.id](http://www.biosains.ub.ac.id) and [www.fkh.ub.ac.id](http://www.fkh.ub.ac.id)*

**KEYWORDS****Animal Research, Breeding, Laboratory mice, Laboratory, Research, Practicum material****INTRODUCTION**

Animal testing, also known as animal experimentation, is an animal that is produced and later be maintained as an animal model in experiments, seeking to control and develop the variables that affect the biological systems under study [1]. Rat (*Rattus norvegicus*) is one of many types of animal testing, which has widely been used as animal laboratory. A certified rat as an animal testing is considered to be critical for the researcher to meet the requirements of the object studies. Several requirements that are mostly needed by the researchers including: feed record, healthy record, breeding record, age, strain, body weight, gender, and its

progeny. There are three strains of *Rattus norvegicus* which have its exclusivity as animal testing, they are: Wistar, long evans and Sprague dawley [1].

The aim of this lblkk program is to provide a learning program on breeding and maintaining the animal testing (*Rattus norvegicus*), which later will be used to produce a qualified animal testing, in order to meet the market demand especially for the laboratories in East Java. This program also accompanied by the students of Brawijaya University, hopefully it will facilitate the students to be more opened-minded on business chances, moreover to build a character as the next young entrepreneur.

Laboratory of Biosains University of Brawijaya (LBioS-UB) is an institution which provide services in several aspects: research/study, laboratory testing, and also workshop, to deliver qualified product and human resources. Faculty of Veterinary Medicine is one of the newest faculty in Brawijaya University, which is met its competency in health aspect, completed by B accreditation. Both LbioS and Faculty of Veterinary Medicine are under Rector supervision.

The entire managerial component of LBioS have committed to apply Internal Quality Assurance System and ISO 9001:2008 consistently and enhancing the quality of services for the customers/users. LBioS is the central laboratory, expected to be professional, reliable, and independent testing laboratory. In research and biological testing, the customer (student/researcher/industry) frequently faced obstacles on providing biological material. One of them is qualified animal testing (rat, mice, guinea pig, ang hamster) from reliable breed, and surely, healthy (pathogenic free).

Main customer in lbikk LBioS-Faculty of Veterinary Medicine UB program are students from bachelor/master/doctoral degree of many related studies such as: agro-complex, biomedic/ medical faculty, veterinary medicine, basic science. Customer, whether from University of Brawijaya itself or local institution, mostly face the same issue, the availability and the quality of the animal testing population that haven't met the demand. This issue could be benefit, later called "business chance", for the LBioS-UB to join with the Faculty of Veterinary Medicine generating a breakthrough product related to animal testing. LBioS carries a modern facilities to maintain animal testing, whilst the Faculty of Veterinary Medicine have both experienced and competent human resources to generate the breeding and maintaining the healthy animal testing.

According to University's policy, the LBioS's roadmap or long term business goal is to conduct business autonomy, especially in management of administration and finance. It has been

supported by the university, which has been provided with the facilities on research and biological production. Managerial inside the LBioS-UB must be able to conduct independent maintenance of its facilities. Thus, the managerial should able to discover the potential business sources related to LBioS's main task and function. One of business chance as the alternative finance income is providing biological materials, animal testing for research model, laboratory testing or student's practice. Another business potency from this program is performing a workshop for the students about "animal testing management and maintenance".

Approaching method to run this business, which is used by LBioS-UB and Faculty of Veterinary Medicine, is preparing the animal testing through breeding and production program, based on standardized quality, surely after being identified the customer demand. The superiorities of the animal laboratory, which later then be produced by LBioS-FVM, are the quality insurance by producing only certified and standardized animal testing and supported by the competency of human resources. the marketing strategy for the local or international scale, in order to promote the product, will be used in this program is via online networking by these two websites: [www.biosains.ub.ac.id](http://www.biosains.ub.ac.id) and [www.pkh.ub.ac.id](http://www.pkh.ub.ac.id).

## MATERIALS AND METHODS

### 1. Examining market demand

Questionnaires were disseminated to researchers, to medical company which is continually use animal testing, and to several students from different universities in order to examine the market demand around Malang, East Java. Another method was also carried out by directly visit some locals institutions which were considered as target market, using the animal testing in a large amount.

### 2. Management of Animal Welfare

Recent public debate surrounding animal welfare and management acknowledges that

LBioS-Faculty of Veterinary Medicine are responsible for ensuring animals testing receive appropriate care and are treated humanely. The animal welfare and management strategy that applied in this program surely meet with the bio-ethical on animal welfare.

Cage management started with appropriate hygiene and sanitation to the animal testing, including: hull replacement, clean up the cage room, the floor, the wall-room, and also the roof. The cage capacity should be considered in comfort range, not too crowded. In addition, room and cage temperature and humidity should be set in proper level.

Extra plaited mats from wire on the cage could be prepared to avoid unexpected conditions such as: animal testing running away, animal testing exchanging from one cage to the other cage, etc. Implementing hygiene and sanitation during animal maintenance is very important to keep the animal in healthy condition and avoid contamination from microorganism.

There are four types of cages in the LBioS for *Rattus norvegicus*, they are: individual cages (for male and female), parent-and their new borns, parental-baby cage, stock cage and quarantine cage.

Each of the cages was made by plastic basin with the dimension as followed: 40 cm in length, 15 cm in width and 10 cm in height. The cages then covered by extra plaited mats from wire with diameter of the plaited wire approximately 0,5 cm. Pada bagian atap ruangan kandang pemeliharaan tikus (*rattus norvegicus*) juga dipasang anyaman besi dengan ukuran 1 cm. The cage separation was conducted to minimize the chance of inbreeding. The regulation of animal testing cages applied according to the standard operating procedure for animal cages.

### **3. Preparation of materials and parent stock**

The materials that were used in producing rat including: cages, square basin for maintaining new rat, drinking places, digital scale, hull, feed and feed supplement, airconditioner, cage cover from plaited wire, recording book for each cages, cleaning tools and stationary.

Preparation for parent stock: a survey was held to several governance providers especially experienced on animal laboratory, such as: rat (*rattus norvegicus*) stockbreeding in Batu, , (*rattus norvegicus*) stockbreeding in Singosari, (*rattus norvegicus*) stockbreeding in LPPT UGM, and PUSVETMA Surabaya. Based on the survey, the highly qualified stockbreeding only found from LPPT UGM and PUSVETMA Surabaya. So that, the stockbreedings were directly chosen from LPPT UGM (Yogyakarta) and PUSVETMA Surabaya. The animal testing (*rattus norvegicus*) were directly imported from the providers (both in LPPT UGM and PUSVETMA) later to be utilized as parent-stock. The transportation was carried out by land transportation using pet-car to establish the optimum condition of the parental-stock. The feed also prepared before to avoid stress.

## **4. Maintanance, Breeding and Recording**

### **4.1. Management of maintenance**

The management of maintenance started with controlling the hygiene and sanitation of the cages, including: hull replacement per day, clean up the cage room, the floor, the wall-room, and also the roof. The cage capacity should be considered in comfort range, not too crowded. Health management carried out daily routine by examining the consistency of feces, the daily amount of feed and drink, behavioural examination, rat's weight gain every 2 weeks, and administration of oral anthelmintic every six months. These procedures were standardized and was aimed to maintain the quality of the breeding result. For the feed intake, AD 2 was chosen to be given in our animal testing. The feed was given as much as 10% from the weight value, approximately 10-15 gram/rat/day. The feeding time regularly done at 07.00 AM and 04.00 PM. The drinking water given ad libitum, and be replaced every day.

### **4.2. Breeding Program**

The mono-mating method was chosen in this program in ratio of male to female rat 1:1. The

male and female rat were put in the mating-cages, supported with CCTV to monitor the mating behaviour. This process was carried out in 6 days, estimated twice estrous cycle. After the mating process, both male and female rat separated into different cages. The next day, the vaginal plug was examined as the marker of direct copulation. The positive vaginal plug inside the female vagina marked the successful of mating procedure. The positively vaginal-plug female later be moved into new pregnant cage until partus.

After partus completed, recording data of the new born by identify some several parameters were held, including: the body weight, physical examination, date of birth, and parent identity. ThenAnd then, the new born and the mother moved into the same cage as long as 21 days. At the end of calving period, the new born rats were separated based on its gender and put them into stock-cage. The parent, both male and female rat, be ready again to be mated as the procedure above.

#### 4.3. Recording

In this program, recording data is the key point to assure the quality of the rats. Including: the strain of both male and female, date of mating procedure, the number of pregnant female, date of fetal birth, the number of babies on each mother, health record, calving period, and calving weight. The entire procedure of the management breeding and recording were evaluated and were done as the standardized operating procedure.

#### 4.4. Promotion and Marketing Strategy

In order to maintain the continuance production, the promotion strategy were held both directly to the customers and via social media. The social media that used in this promotion are: twitter, facebook, LBioS's blog wick directly linked into the LBioS website. The printed media also utilized during the promotion, such as: proposal, brochure, and leaflet, which distributed to students across local universities in Malang, East Java. The promotion strategy need

to consider the market segmentation, so that the market continuance achieve its stability [2]. On the spot service will be applied only for the customer who already ordered days before.

## RESULTS AND DISCUSSION

The implementation of this lBIKK program result in the production of certified and standardized animal testing rat (*Rattus norvegicus*) from strain Wistar Sprague dawley. The animal testing breeding is a managed collaboration between LBioS-Faculty of Veterinary Medicine, Brawijaya University. The products from this program had been disposed into some researchers who done their scientific project in the LBioS, and also distributed to some faculties of Brawijaya University which applying animal testing during student's practice. From the followed marketing, as much as IDR 1.000.000 was collected in one purchasing period. Nevertheless, the Break Event Point (BEP) has not been achieved due to the production process is still less than a year. As a innovation, we would like to expand different animal testing, such as guinea pig, since it has potential market in animal testing, and of course the potential higher demand.

There are many obstacles were found during implementation of this program, one of them is cannibalism between the mother and the new born. This could rapidly decrease the new population. This condition may due to the effect of uncomfortable cages, stressful mother will react to this situation by showing cannibalism. The failure also found during breeding program, thus the population is slowly increased.

The next short-term goal is to produce more population of rats, in order to complete the getting-higher demand from local customers. Thus we consider to apply a modified breeding system using assisted reproduction technology, superovulation. Nevertheless, a comprehensive aspects need to be evaluated, especially the cost of this technology. The next long-term planning is to develop a new animal testing, guinea pig, because we have some requests from our customer.

## CONCLUSIONS and SUGGESTION

The conclusion of this lBIKK program, as the following result above, indicated that the development of breeding management successfully produced standardized and certified rats (*Rattus norvegicus*) as the animal testing laboratory, on both strain Wistar and Sprague dawley. Meanwhile, the production of rats successfully distributed in several local universities on East Java, including Brawijaya University.

The suggestion addressed to this program, submitted from the customers, is to produce a large number of the rats continuously and to meet the specification list as requested by the customer. According to the market evaluation, the major demand including: the female rat's weight approximately 150-200mg and the male rat about 200-300mg.

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