The effect of environmental factors on the productivity of Kampung Unggul Balitbangtan (KUB) chicken in Nusa Tenggara Timur (NTT)

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Abstract: Kampung Unggul Balitbangtan (KUB) Chicken is a selective range chicken with high egg production. This research aimed to determine the effect of environmental factors, i.e. wind speed, humidity, and temperature, on the productivity of chicken eggs Kampung Unggul Balitbangtan (KUB) layer 45-48 weeks. The research was conducted in October 2020, located in Assessment Institute for Agricultural Technology of Nusa Tenggara Timur (NTT). The data obtained by measurement and calculation of population data, egg production, and mortality. The result showed that the average environmental factors in wind speed, humidity, and temperature were 21.40 m/s, 79.50%, and 30°C. The average egg productivity, body weight, and KUB chicken mortality in the laying phase at 45-48 weeks were 33.56%, 1.684 kg, and four chicken/week. All environmental factors together affect the productivity of KUB chicken in Nusa Tenggara Timur.

1. Introduction
The provision of livestock meat nationally was 3,467,598 t in 2017, where broilers were able to supply 2,046,794 t (59.03%), and local poultry 300,129 t (8.66%) contributed to national meat production [1]. The biggest dominance of poultry food is supplied from purebred chickens (broilers and layers), while local poultry is still low, but has the potential for its market segment and is quite large community so that it continues to be improved. The Ministry of Agriculture launched a Seedling Program in 2018. This program aims to provide superior adaptive varieties with high productivity according to user preferences. One of the Agency’s innovations for Agricultural Research and Development is superior local chickens to meet market needs for native chickens [2].

Kampung Unggul h Chicken (Agricultural Research and Development Agency), often referred to as KUB chicken, is a new strain of chicken that is superior in native chicken varieties. KUB chicken is a type of native chicken due to research innovation from the Animal Research Institute, Ciawi-Bogor, with crossing pure native chickens for six generations [3]. [4] stated that KUB chicken has the advantage of producing eggs higher than ordinary native chickens. This chicken is a dual-purpose chicken that can be used as a broiler or layer [4]. KUB chickens’ existence in terms of germplasm resource aspects is a form of the local Indonesian chicken's diversity that can be bred. It can be cultivated commercially to help fulfill community nutrition, especially for animal protein, and increase farmers’ income. KUB chickens are currently being developed by several regions in Indonesia, especially Nusa Tenggara Timur, an area with KUB chicken development potential [5].

Assessment Institute for Agricultural Technology (AIAT) of NTT is one of the KUB chicken source centers in Kupang Regency, NTT. Currently, the demand for KUB chicken seedlings in NTT is increasing. Therefore from the point of view of hatchery management, it is necessary to increase it
to produce optimal KUB chicken seeds [6]. One factor affecting KUB chickens’ productivity is environmental factors, including wind speed, humidity, and temperature.

Based on the description above, this paper aims to describe KUB chickens’ potential and production performance, which are influenced by environmental conditions in NTT.

2. Materials and methods

2.1. Location and time
This research was conducted at the hen house of BPTP Balitbangtan East Nusa Tenggara for one month, October 2020.

2.2. Research material
The materials used in this study were the Kampung Unggul Balitbangtan (KUB) chickens aged 45-48 weeks (layer phase), 270 female chickens. The maintenance hen house uses a litter model with an area of 8 meters x 12 meters, commercial concentrate feed in the form of pellets, mixed with additional feed in the form of moringa leaves, papaya leaves, and water spinach, and drinking water is given ad libitum.

2.3. Research methods
The data collection system was carried out by observing the development of layer-phase KUB chickens. The data observed included daily egg production (hen day), body weight, mortality, and environmental conditions (temperature, wind speed, humidity). The following formula for calculating daily chicken egg production (Hen Day Production) and feed conversion (Feed Conversion Ratio) as follows:

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\text{Hen Day Production (HDP) = \frac{Egg Production (grain)}{Hen population}} \times 100\% 
\]

After the data was observed and recorded, the data were analyzed quantitatively and presented with tables. The qualitative analysis was explained descriptively by comparing the literature.

3. Results and discussion

Kampung Unggul Badan Litbang  chicken rearing system in the Assessment Institute Agricultural for Technology of Nusa Tenggara Timur house is maintained with an intensive system in the form of a postal cage. The semi-intensive system is that the chickens are kept in a cage with a litter pad in soil. The livestock is released in the yard in the morning. The results showed that environmental conditions had a significant effect (P < 0.05) on the egg production of Kampung Unggul Balitbangtan (KUB) chicken eggs. The effect of environmental temperature on egg production is presented in table 1.

| Age | Temperature (°C) | Egg Production (Grain) | Hen Population (Chicken) | Hen Day Production (%) | Weight Gain (gram) | Mortality (chicken) |
|-----|-----------------|------------------------|--------------------------|------------------------|--------------------|---------------------|
| 45  | 29              | 91                     | 281                      | 32.23                  | 1624               | 4                   |
| 46  | 30              | 98                     | 277                      | 35.28                  | 1676               | 7                   |
| 47  | 29              | 92                     | 272                      | 33.67                  | 1684               | 4                   |
| 48  | 27.5            | 90                     | 270                      | 33.23                  | 1753               | 3                   |
| Average | 28.88 | 92.75 | 275 | 33.60 | 1684.25 | 5 |

| Source: Primary Data, 2020 |

Temperature is an important factor in housing because it is a controlling factor that could affect livestock's physiological and biochemical activities [7]. The average hen house temperature during the observation was 28.88°C. The temperature of the hen house that could
make chickens feel comfortable is 18-28°C. During the observation period, the coop's temperature was in a condition that made the chickens feel comfortable. Still, this condition did not significantly affect the egg productivity of KUB layer chicken eggs (p-value= 0.7396). This condition proves where laying hens had better production performance at neutral temperatures (18°C) [8,9].

The average egg productivity during the observation (aged 45-49 weeks) was 33.60%. The percentage of KUB chicken egg production with intensive maintenance is 44-70% [10]. This is not appropriate because the temperature in NTT is extreme, so egg production is below average.

4. Conclusions
Temperature is an important factor in housing because it is a controlling factor affecting livestock physiology. During the observation (aged 45-49 weeks), the average egg productivity was 33.60% in temperature 28.88°C. The environmental conditions had a significant effect (P <0.05) on egg production of Kampung Unggul Balitbangtan (KUB) chicken.

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