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## Effects of developmental stages and gender in redox status of farm animals

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### Introduction

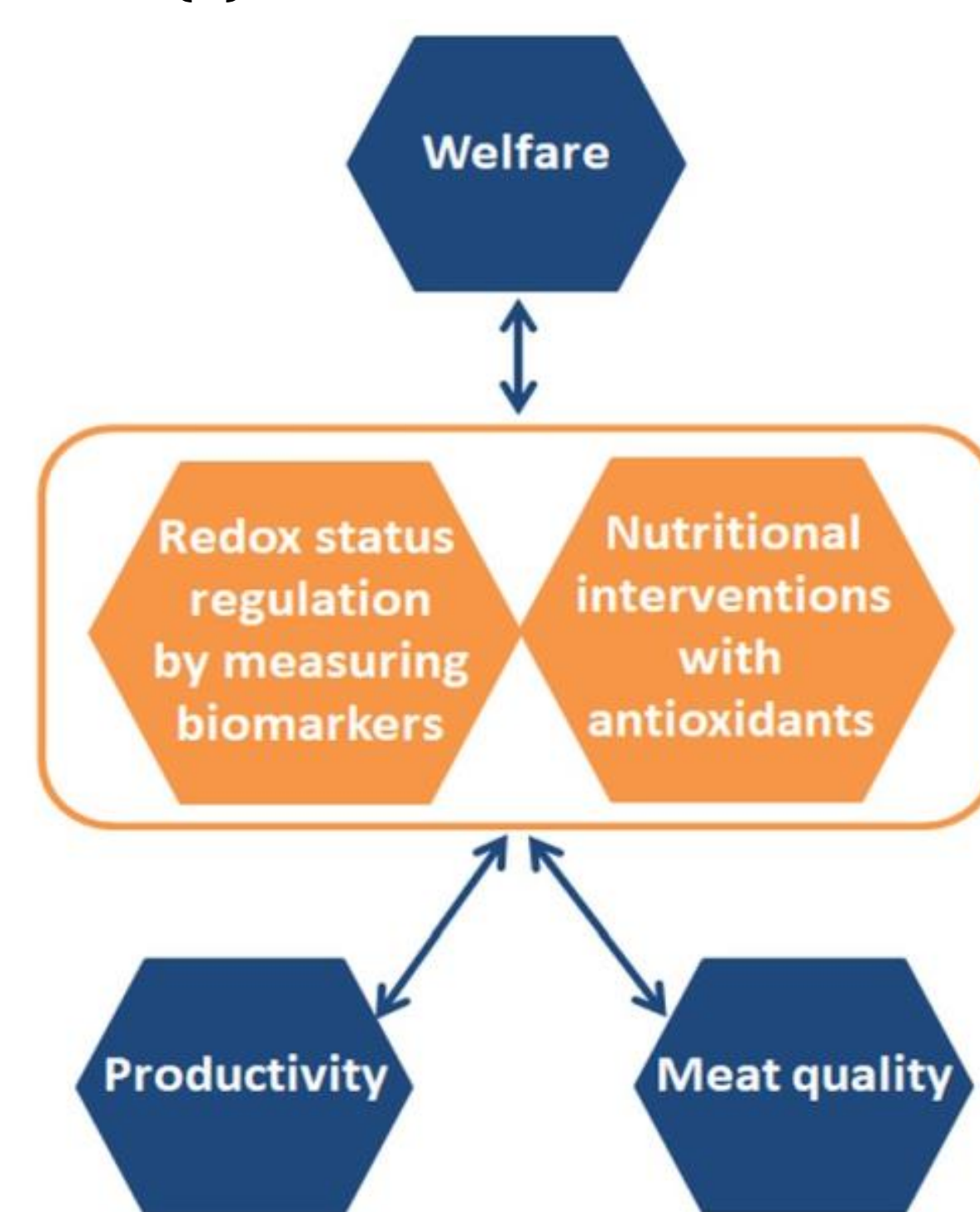
Nowadays, humans worldwide depend utterly on animals for the production of meat, fat, milk and other essential products. Therefore, the demand for livestock products has been increased and world livestock production is facing major challenges that endanger the welfare and health of animals and, consequently, their productivity (1). The primary purpose of modern livestock industry is to highlight the interrelation between farm animal welfare, productivity and meat quality with redox status regulation (Fig. 1). On the basis of consumers' awareness and desire for healthy and qualitative animal products, we suggest that it is of utmost importance to determine redox biomarkers in farm animal blood and tissues. Severe infectious diseases in farm animals have been recorded in a plethora of publications and are mainly associated with oxidative stress, a major health-related issue in modern livestock units (2). Moreover, according to the literature there is an apparent association between gender and oxidative stress in several animal models, females being less susceptible to it (3).

### Aim of the study

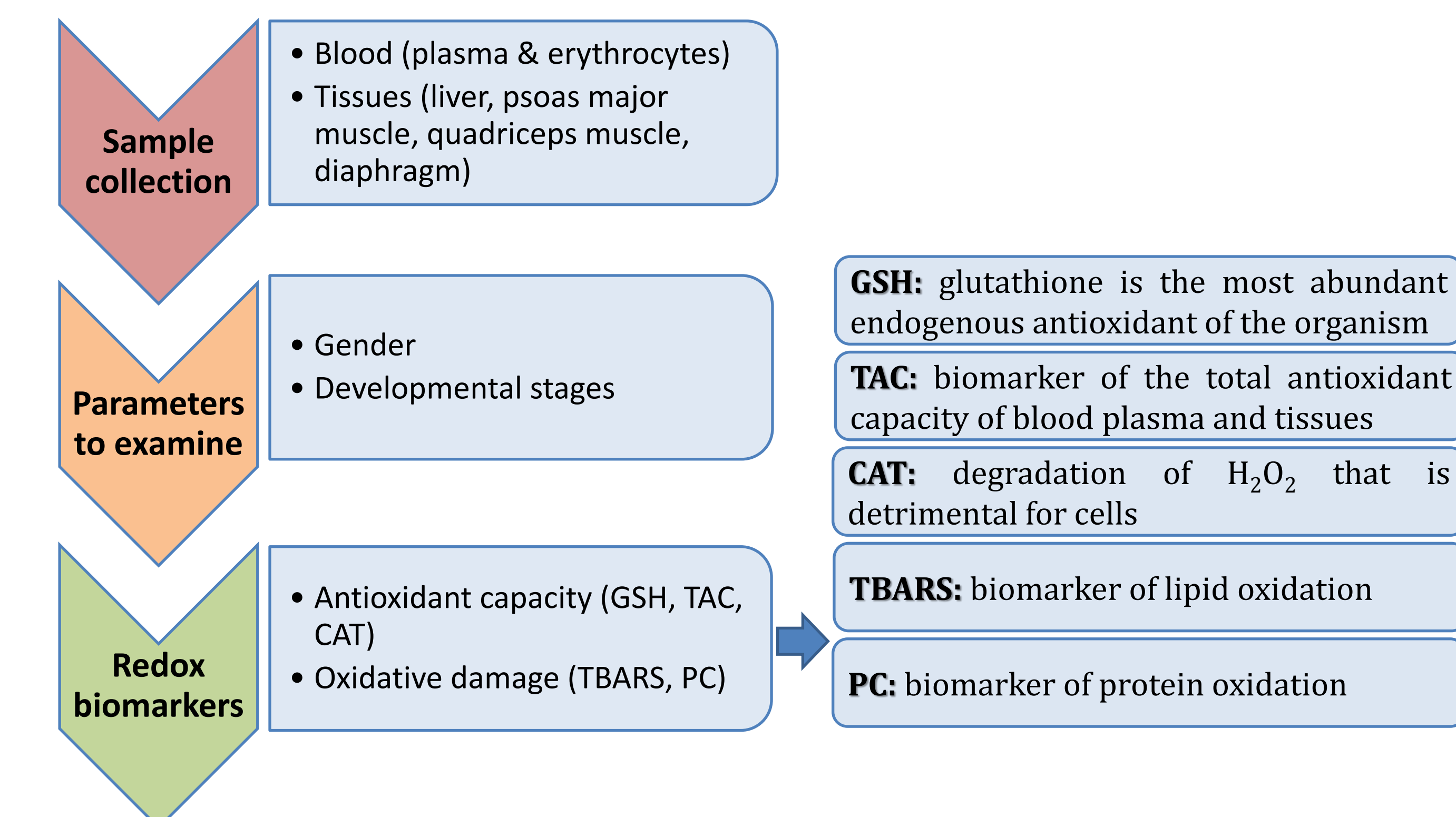
✓ **Creation of a database for correlating the redox status of two farm animal species, with the gender, the meat quality and their growth and dwelling conditions**

✓ **Evaluation of farm animal redox status and adoption of the appropriate practices in order to:**

- Protect tissues from harmful oxidative modifications
- Avoid animal mortality
- Enhance animal productivity and improve meat quality and quantity



**Figure 1.** The interrelation of farm animal welfare, productivity and meat quality with redox status regulation and antioxidant supplementation as a promising nutritional intervention (1).



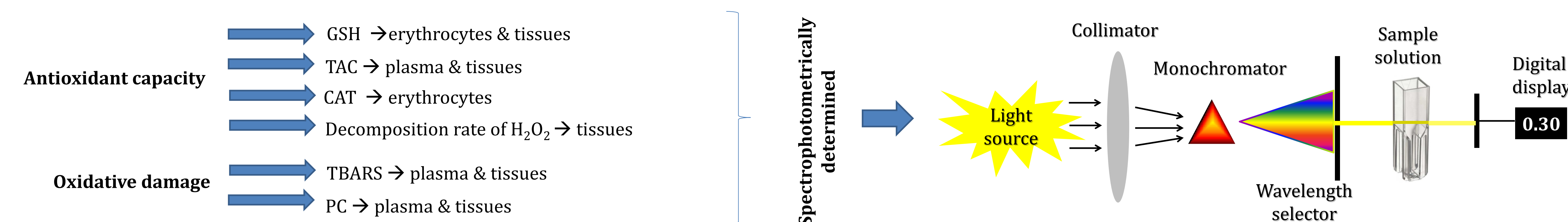
**Figure 2.** The flow chart of the study.



### Acknowledgments

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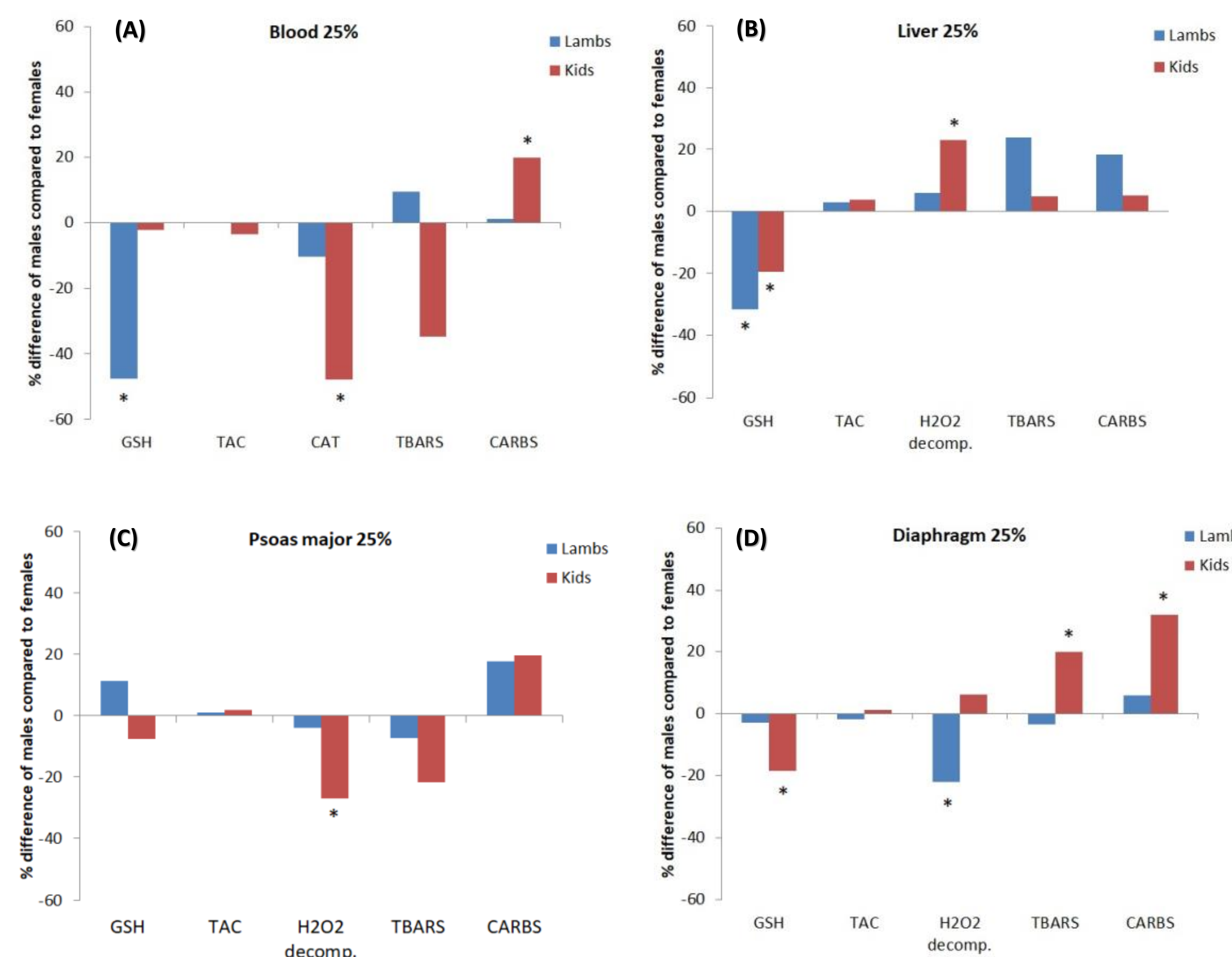
### Materials and methods



**Figure 4.** The principle of spectrophotometry.

### Results

➤ The male animals exhibited reduced antioxidant capacity compared to the female, as indicated by the reduced glutathione and catalase levels in blood, liver and diaphragm and increased oxidative damage, as indicated by increased PC and TBARS in blood and diaphragm.



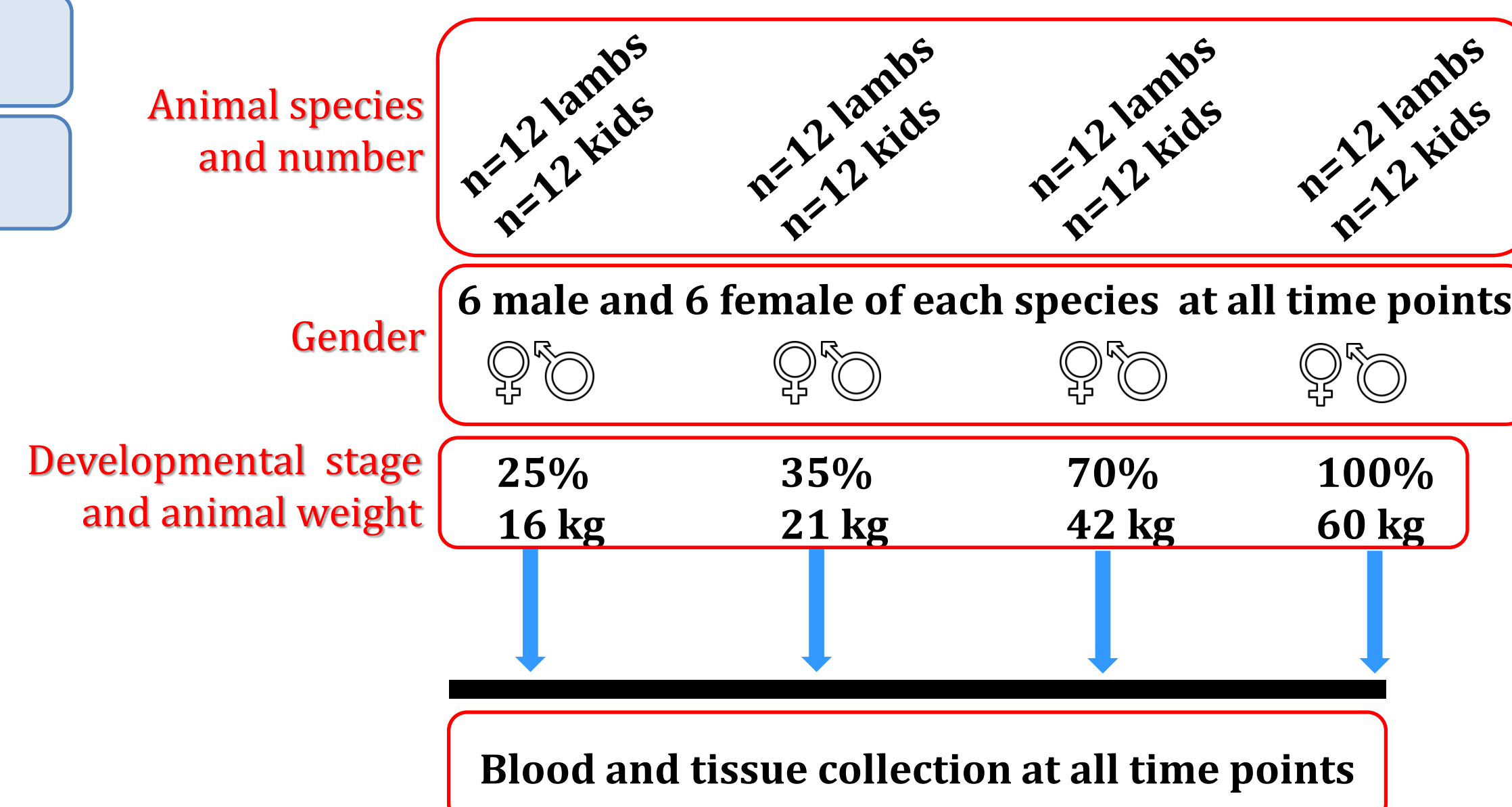
**Figure 5.** Percentage difference of redox biomarker levels in males compared to females at the first developmental stage (25%). (A) Blood (B) Liver (C) Psoas major muscle (D) Diaphragm \* Statistically significant difference between males and females of the same species at the same sampling time (p < 0.05).

### Discussion and conclusions

- ✓ The male animals seem to be more susceptible to oxidative stressors at the first time point of the study compared to their female counterparts.
- ✓ It has been proposed that gender is a crucial factor in regulation of redox status and in the onset of diseases associated with oxidative stress in animals and humans (4,5,6,7). However there is no available evidence for farm animals.
- ✓ Our results indicate that the alterations in the tested redox biomarkers exert tissue specificity.
- ✓ This is an ongoing study. We intend to evaluate the redox status of quadriceps muscle as well and collect samples from three more developmental stages of the animals. Thus we will confirm or not the motif of redox status alterations reported hereby.
- ✓ We propose that evaluating various biomarkers will help researchers and producers to adopt conditions for optimal growth of farm animals, therefore promoting the sustainable development of the livestock industry.

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**Figure 3.** Study design. A total of 96 farm animals (48 lambs and 48 kids) will be slaughtered in four different developmental stages of both genders.