Reviewer 1

The proposed work has merit in meeting SAAESD Priority Areas Goal 1,4 and IPM. Combining resources across southern universities is efficient use of resources, both monetary and biological. In order to achiev proposed goals, especially genetic assessment, larger animal numbers are needed; a multi-state evaluation helps achieve these numbers. The ranking of 'Good' in two areas is based on the lack of detailed methodology and justification for the development of new assessments.

Methods:

Activity 2: All objectives – Economic Analyses. NPV has been used in previous work and is appropriate for the current study. What simulation methodology is going to be used to incorporate risk and uncertainty? Will you develop a decision tool for the cow-calf level or use a current modeling tool?

Response:

The program Simetar (Richardson et al., 2008) was developed within Microsoft Excel to incorporate necessary simulation methodology. The uniqueness of the traits, the meshing of economic and genetic information and the evaluated breed types of cattle within objectives will drive the development of decision tools for producers in the cow-calf segment, rather than employing an existing tool.

Text added to this section to address this comment and a later comment.

Objective 1:

Obj. 1.1 > External parasites. Outputs state development of new standardized measures for tick count. How does proposed methodology differ from current methodology for tick evaluation?

Response:

Previous studies have used video and still photography to collect images of the cattle and then manually count the ticks or horn flies on the animal (Lima et al., 2002; Castro et al., 2005). This process is difficult under field conditions and very time consuming. Due to the limited locations on the cattle that the ticks are concentrated in (under tail and between hind legs), based on previous observations, it was determined that a visual scoring system would be appropriate. There is sufficient variation in tick burdens between animals that make this system useful and meaningful under the conditions at the farm.

Castro, E.,Gil, A., Solari, M.A. and Farias, N.A. (2005) Validation of a subjective counting method for a horn flies (Haematobia irritans irritans) (Diptera: Muscidae) population in a cattle herd. Vet. Parasit. 133:363–367.

Lima, L.G.F., Prado, A.P.and Perri, S.H.V. (2002) Comparison of two methods (visual estimates and filming) for counts of horn flies (*Haematobia irritans irritans*) (L.) (Diptera: Muscidae). Vet. Parasit.103:227–235.

Will there be an evaluation of the new standardized measures versus other evaluation methods?

Response:

There will not be a comparison as all the tick counts will be collected in the current project using the visual scoring system. Using just the one method will standardize the measurement throughout the study.

What statistical analysis will be used to evaluate differences in tick counts? Is it the mixed model approach in ASREML. Be explicit. Statistical analyses should address continuous vs. discrete nature of dependent variables.

Response:

Text added to activities under sub-objective 1.1—yes, mixed linear models, with random animal. Data will be analyzed after transformation using a link function (e.g., probit) that is appropriate for categorical data.

Obj. 1.2 > Would like more methodology detail. What digitial quantification software will researchers or will new software be developed?

Response:

Text added to to this end in the activity section under sub-objective 1.2. We don't anticipate (but will not rule out) development of software relative to this sub-objective.

Outputs state development of new standardized measures for eye pigmentation. Will there be an evaluation of current methodology vs. the proposed?

Response:

To our knowledge there exist no standardized measures for eye pigmentation. We will evaluate methodology in comparison to subjective scoring of eyelid pigmentation (using a 1 to 5 score where 1 indicates no pigmentation and 5 is complete pigmentation and each intermediate score indicates a proportional increase in pigmentation; either for eyelids or corneoscleral pigmentation) in comparison to new methodology to assess potential value of the new.

Researchers mention participation of multiple sites is necessary for adequate evaluation of eye pigmentation, but no mention is made of what biological/breed types are available. In the introduction, a reference is made to Braford. What are the proposed animal breed types and numbers?

Response:

Added text to this end in the activities section of sub-objective 1.2. Briefly, the breed types to be evaluated include 1) straightbred Hereford, 2) Hereford-*Bos taurus* crosses (to date those have been

Angus), 3) Hereford-*Bos indicus* crosses (including Braford in this category even though it is recognized as a distinct breed).

How will data be analyzed? What are the fixed and random model effects? Are they the same as the fly count? Again, methodology should address nature of dependent measures.

Response:

Text added to address these questions under activities for sub-objective 1.2. Models and effects will be similar to those in the sub-objective 1.1, but not identical. Yes, we agree, responses will not be normally-distributed and will need to have link functions applied before analyses.

Obj. 1.3 >Same as above in terms of developing new standardized methodology vs. current methodology. Will there be an evaluation of the new vs. current udder scoring methods?

Response:

Although we do not propose to develop new standardized methodology for evaluation of udder characters, if this work makes another methodology advantageous or obvious, we would incorporate evaluation of such measures to those currently supported by Beef Improvement Federation guidelines.

Obj. 2 > How will meta-analyses be conducted? Very little detail given to achieve Objective 2 other than assignment of responsibilities.

Response:

Detail added to the activity section for objective 2 to address these concerns. Some modifications to the previous text were made as well and are included.

Obj. 3 > Heat tolerance is measured as hair shedding. Are other hair characteristics to be evaluated? Good description of fixed effects and production traits to be included in model. Is the analysis ASREML? Specific methodology should address continuous vs. discrete nature of dependent measures.

Response:

Other hair characteristics, such as weight of a shaved sample, and infrared measurement of skin temperature at shaved and non-shaved areas, have been measured on subsets of project animals; these may be expanded.

Yes, again, dependent variables will not be normally-distributed and will need to be handled using the methodology added in the activities under objective 3.

Obj. 4 > Good description of methodology. Expand statement regarding reproductive traits to be analyzed as binomially-distributed variables using appropriate methodology. What is current proposed genetic evaluation tool for binomially-distributed traits such as reproduction?

Response:

Text added at the end of this section applies to reproductive rates and other traits which also could be parameterized as 0/1 variables. Our proposed genetic evaluation tool is the generalized linear mixed model employing pedigree (that is, animal as a random effect) with link function (logit). Others do this as well and maybe for genetic evaluation purposes (dairy possibly), but no beef cattle breed association to our knowledge uses these generalized linear mixed models for this purpose currently.

Outputs > Database development is paramount to the success of the proposed research. I believe the phenotypic and genomic data to be developed will benefit beef cattle producers in the Southern region as well as those in similar environments globally. Changing times require updated methodology; this project will add to the current genetic and economic evaluation methodology.

Output 6 is threaded throughout the proposed research. Output 7, while a component, is not described in much detail other than NPV evaluation. More time discussing the decision-support methods or tools is warranted.

Response:

Text added in Activity 2 to describe this area more fully.

Timeline appears appropriate. The evaluation in 2017 will be key in rapid publication at the end of the funding period. It will expedite the analyses.

One last comment: Pay attention to detail regarding mechanical errors in formatting.

Reviewer 2

Ambitious study. Look forward to seeing the results.

Reviewer 3

With 550 cow and a 5 year project, 2000 to 2500 observations per trait will likely be available. This should be sufficient for estimation of univariate genetic parameters and perhaps bivariate estimation of correlations among traits. This project will be enhanced if it is extended for an additional 5 years after the completion of the current project.

Reviewer 4

This is needed research, particularly with warming climate. Citing the recently released report on climate change could strengthen the justification of the work.

Response:

Added text and cited Field et al. (2014) as suggested in the Statement of Issues and Justification.