REQUEST FOR PROPOSALS

Researcher (Literature Review):

Honey Bee Nutrition

Issue Date: December 11, 2015
Response Deadline: January 22, 2016

Background:

The Honey Bee Health Coalition was formed in 2014 as a cross-sector effort to promote collaborative solutions to honey bee health challenges. The diverse Coalition brings together beekeepers, growers, researchers, government agencies, agribusinesses, conservation groups, manufacturers and brands, and other key partners dedicated to improving the health of honey bees and other pollinators. The Coalition's mission is to collaboratively implement solutions that will help achieve a healthy population of honey bees while also supporting healthy populations of native and managed pollinators in the context of productive agricultural systems and thriving ecosystems.

A major tenet and founding principle of the Coalition is the recognition that the current decline in overall honey bee health is a multi-factorial problem, and all stakeholders have a role to play in managing bee health issues. The Coalition is focusing on accelerating improvement of honey bee health in four key areas: forage and nutrition, hive management, crop pest management, and outreach, education and communications.

For more information on the Coalition, please visit: www.honeybeehealthcoalition.org

Purpose of the Request for Proposals:

As part of the forage and nutrition focus area, the Coalition aims to advance pre-competitive solutions and research addressing honey bee nutrition by starting with a broader assessment of honey bee nutritional needs.

Honey bees, like all animals, require essential nutrients to survive and reproduce. The basic nutritional requirements of honey bees include the appropriate ratio of carbohydrates, lipids, amino acids, vitamins, minerals and water in order to ensure survival and reproduction. Honey bees that are kept commercially are particularly at risk of malnutrition due to movement of colonies and lack of forage.

The purpose of this project is to conduct a rigorous and thorough review of the honey bee nutrition literature. The outcome of the literature review should be a comprehensive summary of the state of knowledge of honey bee nutritional needs. This would include a discussion of the strengths and limitations of the existing data and a summary of the knowledge gaps that need to be addressed. The format of this review is not set, and is open to proposal. Due to the immense interest in the topic, the collaborative spirit surrounding honey bee research, and the diversity of audiences who may utilize this information, the Coalition feels there should be flexibility in how we approach this document, and the other desired deliverables discussed below.

Honey bee nutrition is a rapidly evolving field of science with many new research efforts currently underway. The Coalition envisions the literature review would be used to direct subsequent research activities and advance our overall understanding of honey bee nutrition. This might include helping to guide research into nutritional supplements for bees and the development of activity-specific products that could help mitigate the impact of stressful activities, such as transportation.

While this request for proposals focuses on the literature review and synthesis, the Coalition also envisions several other potential deliverables beyond the primary document. These may include a dynamic web-platform for continually updating our knowledge on honey bee nutrition, a database of pollen nutritional values, and summary of knowledge gaps. The ultimate ability to create educational tools from this information is also of high interest. Accordingly, the Coalition is seeking qualified experts or teams to develop the initial literature review that may also have capability and interest to work on other deliverables in subsequent phases.

Scope of Work:

The Coalition is seeking proposals from qualified candidates to perform research analysis, draft the literature review, and maintain a comprehensive record of all information assessed and included in the final product.

The Coalition is interested in approaches that creatively address the challenge of preparing a literature review on a topic with continually emerging research – for example, approaches that provide solutions for how a review could be continually updated in an effective format (i.e., a wiki or other web-based platform).

This is a dynamic project that may require the skill set of more than one researcher. The Coalition is open to submissions from individuals, small teams, and/or submission from an individual with the acknowledgement or request that they may need to acquire additional help with some aspects. The researcher/researchers should reflect this in their submitted budget.

Additionally, the researcher(s) will work in correlation with a sub-group of Coalition members, through an iterative process, to refine the document (and/or other platform) based on their input and feedback. These meetings will likely take place a few times during the drafting of the literature review and on an as-needed basis during the finalization of the review.

See Appendix A for a thorough outline of the scope to be included in the final document and/or other format.

The successful researcher or project team will be required to perform the following tasks.

- Perform a thorough literature search of all relevant research related to the proposed topic.
- Prepare a literature review and synthesis listing trends that emerged, possibilities that have been overlooked, research that has shown promise or has shown to be irrelevant, and recommendations for further research.
- Submit an annotated citation list.
- Prepare a summary of knowledge gaps.
- Participate in sub-group calls and incorporate their feedback and input, as appropriate. The researcher may also be asked to attend an in-person Coalition meeting to review the draft in May 2016
- Highly desired, may be phased or performed concurrently: Design and implement a mechanism for the information to be hosted and updated in a dynamic format that recognizes the evolving state of science for honey bee nutrition.

The exact timeline for each task should be included as part of the final proposal; the desired delivery date (pending agreement on exact format) of the draft literature review is May 1, 2016 and the final review is desired by July 1, 2016.

Minimum Qualifications:

This RFP is open to academic researchers, mentored/supervised graduate students, or other professionals meeting the minimum qualifications. All submissions received will be evaluated to determine if they meet the minimum requirements as follows:

- **Researcher Qualifications**
  The successful researcher must have the educational background, knowledge and skills necessary to perform the literature review. In addition, the successful researcher must be able to judge the rigor and scientific merit of research publications by evaluating the experimental design, data collection procedures, statistical methods, and validity of conclusions drawn. The successful researcher must be able to understand refereed journals and research articles and assess their value to include in the review.
- **Literature Access**
  The successful researcher must have a means of accessing the relevant research and technical publications from appropriate sources, including refereed journals. Use of citation management software that maintains a database of pdf copies of articles and exports a citation list is preferred (i.e., BibTex, Endnote, or RefWorks). An otherwise qualified candidate without current access to these tools may still submit a proposal and should indicate– as part of his/her budget and scope, or otherwise – how this capacity will be obtained for the project.
- **Communication Skills**
  The successful researcher must be able to communicate the results of his/her analysis in a well-written manuscript with comprehensive citations, suitable for publishing in a peer-reviewed journal. The successful researcher may also be asked to present a summary of the results to the Honey Bee Health Coalition during their semi-annual meeting. In addition, project teams may incorporate additional communications, outreach, and education skills relevant to the development of online and/or other tools for dissemination, education, and dynamic incorporation of evolving knowledge.

Budget and Time Frame:

Please include a budget with your proposal that encompasses all costs, including any direct costs, and estimated time frame to complete the work. Please consider the following tasks when drafting your budget:*

- Research and analysis
- Drafting the literature review and summary of knowledge gaps
- Participation in sub-group teleconference meetings and in-person meeting
- Document finalization
- Web platform, wiki, or other interface design and implementation for continual updates and impactful communication of information

**Please also describe, if applicable, any matching resources (in-kind or financial) that the proposed individual, team, or institution can contribute to meet the budget for this effort.*

Guidance for Submittals:

- Proposals are due by January 22, 2016 and should be submitted electronically to: Julie Shapiro (jshapiro@keystone.org)
- Questions about the proposal should be written and sent electronically to: Julie Shapiro (jshapiro@keystone.org)
- The submitted proposal should include:
  - A summary of your approach to complete the literature review
  - Budget and estimated timeframe to complete the work
  - Suggested approaches to creatively address the challenge of preparing a literature review on a topic with continually emerging research – for example, approaches that provide solutions for how a review could be continually updated in an effective format

- Current Resume or CV and statement of qualifications and ability to perform a literature review project; if your proposal includes a team approach, please include qualifications for the primary members of your team.
- One writing sample, written within the last 5 years
- Desired but not required: Example of web-based platform that would provide an appropriate model for a continuously updated honey bee nutrition literature review interface

Basis for Selection: The Coalition will evaluate the qualifications and proposals of submitters and develop a short list to interview. The Coalition will rank the interviewed submitters, and negotiate the detailed scope of work and final budget with the top-ranked submitter. Compensation may be based on a fixed firm price or time and materials, depending on the final negotiated scope of work and budget.

Appendix A: Honey Bee Nutrition Literature Review Scope

The final document will encompass the following:

- What are the basic nutritional requirements for the European honey bee *Apis mellifera*?
    - What is the state of knowledge pertaining to the minimal nutritional needs (carbohydrates, proteins, fats, vitamins, minerals, water) of honey bees?
    - What is the state of knowledge pertaining to the optimal nutritional needs (carbohydrates, proteins, fates, vitamins, minerals water) of honey bees?
    - What is the state of knowledge of the nutritional profile of bee bread (carbohydrates, proteins, fats, vitamins, minerals, water)?
    - What are the gaps or limitations in the current understanding of minimal and optimal honey bee nutrition that needs to be filled?

- What are the impacts of malnutrition on honey bee health?
    - What are the symptoms of malnutrition?

- What is the state of knowledge pertaining to the appropriateness of different food sources for bees?
    - Are bees attracted to forage sources that align with those that would provide bees with optimal nutrition?
    - What plants supply optimal nutrients in nectar and pollen?
    - Is there an optimal Pollen Protein content? If so, what is it? And, how important is it for a plant to have it?
    - How does nutrient demand vary depending upon season/needs of the colony (eg swarming, drone production, drought, fall, high mites/virus/nosema, etc?)
    - What is known about the nutritional profiles of existing supplements for honey bees and how do these meet the nutritional needs of honey bees? How do we assess the value?
    - Do bees use pollen from supplements differently than pollen collected in the field?

- What methods are used to measure colony nutritional health, both in laboratory and field conditions?
    - Can a recommendation for standard best practices be made based on commonality in protocols?
    - Can we develop guidelines for the use of supplements?
    - Is therea rapid field test to assess the nutritional status of honey bee colonies? Can a rapid field test be developed?

- Does the nutritional profile of pollen differ based on soil composition? For example, does pollen from canola grown in Alberta have the same nutritional profile as pollen from canola in Ontario? How do pH and soil moisture affect pollens' nutritional profile?