

IOWA STATE UNIVERSITY

Agricultural and Biosystems Engineering

Carl J. Bern

University Professor

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Education

Ph.D. Agricultural Engineering, 1973
Iowa State University

M.S. Agricultural Engineering, 1964
University of Nebraska

B.S. Agricultural Engineering, 1963
University of Nebraska

Honors and Awards

ASABE Student Branch Faculty Member of the Year (2011)

National Food and Energy Council Electric Technology Award, American Society of Agricultural and Biological Engineers (2005)

ISU Foundation award for Outstanding Achievement in Teaching (2005)

Massey-Ferguson gold medal award "For advancement of engineering knowledge and practice in agriculture" - American Society of Agricultural Engineers (2004)

Recent Publications

Bern, C.J., A Yakubu, T. J. . Brumm. 2011. Hermetic maize storage systems for subsistence farmers. Proceedings of XXXIV CIOSTA CIGR V Conference 2011, University of Natural Resources and Applied Life Sciences, Vienna, Austria, June 29-July 1.

Bern, C. J., Pate, M. B., Shivers, S. 2011. Operating characteristics of a high-efficiency pilot scale corn distillers grain dryer. *Applied Engineering in Agriculture* 27(6):993-996.

Keren, Nir, S. A. Freeman, J. D. Harmon, **C. J. Bern**. 2011. Testing the effectiveness of an on-line safety module for engineering students. Accepted for publication in the *International Journal of Engineering Education*.

Yakubu, A. S., **C. J. Bern**, J.R. Coats, T. B. Bailey. 2011. Hermetic on-farm storage for maize weevil control in East Africa. *African Journal of Agricultural Research* 6(14):3311-3319.

White, S. D., P. T. Murphy, **C. J. Bern**, J. (Hans) van Leeuwen. 2010. Controlling deterioration of high-moisture maize with ozone treatment. *Journal of Stored Product Research*. 46(1):7-12.

Bern, Carl, T. Brumm. 2009. Test weight deception. ISU Extension PMR 1005 (Peer reviewed)

Teaching

Dr. Bern teaches courses on grain/oilseed preservation, handling and processing, and in electric power/electronics applications. Each of his courses includes a hand-on laboratory component which takes place in the Biomaterials Laboratory or in the Electric Power and Electronics Laboratory.

Research

Dr. Bern's research focuses on storage of corn, edible beans, soybeans, distillers grains, and biorenewables including corn cobs and corn stover. Current projects involve storage of corn and edible beans on subsistence farms, drying corn cobs and corn stover, and preserving wet distillers grain during storage.

Hermetic storage of corn and edible beans on subsistence farms

Subsistence farmers all over the world depend on corn, beans, and other crops they grow to feed their families. Because of the storage practices used, on average over one quarter of their corn and bean crops are lost due to deterioration during storage. This huge mass of grain can be available for use with no additional land, seed, fertilizer, labor, and other inputs if storage losses can be reduced. Dr. Bern is working to develop hermetic storage systems which will allow subsistence farmers to reduce or eliminate storage losses of grain without use of chemicals. Projects are currently underway in Honduras, Tanzania, Uganda, and India. Current laboratory work underway in Ames involves quantifying the oxygen requirements of bruchids (*Acanthoscelides obtectus*), determining if hermetic storage can be used for corn seeds without loss if germination, finding appropriate storage containers for farmers to use for grain storage, and designing sealing procedures for hermetic structures on subsistence farms.

Preventing deterioration of wet distillers grain during storage

The expansion of dry grind ethanol production in Iowa has resulted in greatly increased production of distillers grain as a co-product. Distillers grain is a desirable animal feed and can be fed wet or dry. Feeding it wet eliminates costly drying, but the wet material deteriorates quickly and presents handling problems. Projects are under way to learn ways to prolong the storage life and to improve handling procedures.

Corn cob and stover drying

Cobs and stover are seeing increased use as industrial feedstocks and fuel for direct combustion. Drying before use is often necessary to prevent spoilage and to reduce mass. A project is in progress to test a peanut dryer for use in drying corn cobs or corn stover.

Undergraduate research

Dr. Bern mentors several undergraduate students conducting research projects each year. These students may be enrolled in an independent study course, or Honors students pursuing independent study projects, or students completing term projects or capstone projects. His students are encouraged to enter regional or national competitions, to present their research at technical conferences, and to publish their research in refereed journals. Thirteen students mentored by Dr. Bern have placed first the K. K. Barnes-American Society of Agricultural and Biological Engineers undergraduate student paper contest. Nine have published research in refereed journals.

