

Methodologies And Data Sources Used in Determining the 2005 Calendar Year Landlord Net Rental Income for Pasture and Rangeland for the Agricultural Land Use-Values

The Department of Agricultural Economics, Kansas State University (KSU), in cooperation with the Division of Property Valuation (PVD), has developed the following procedures for determining the landlord's share of net rental income for pasture and rangeland in Kansas following the guidelines set forth in K.S.A. 79-1476. The statute dictates that pasture and rangeland are to be valued for property tax purposes based on the net rental income received by the landlord. The methodology and sources of data are outlined in this document.

K.S.A. 79-1476 requires that an 8-year average of landlord net returns be used by PVD in determining the agricultural land use-values. For the 2005 valuation year, the 8-year average is comprised of 1998 through 2005 calendar year data. KSU calculated landlord net returns for 1998, 1999, 2000, 2001, 2002, 2003, 2004, and 2005 according to directives issued by PVD. Thus, the 2005 calendar year data were added to the data series, and PVD excluded one year of data to keep the 8-year average intact. The 1998-04 calendar year data, which were utilized in the 2000-2006 valuation calculations, are documented and explained in previous editions of this text. This text documents the methodologies and data sources used to calculate the 2005 calendar year net returns which were combined with the prior year's data by PVD to yield the 8-year average. The main components of the pasture analysis explained in this text are soil mapping units, grazing productivity indices, rental rates, gross rental income, expenses, management fee, and landlord's net rental income.

The 2005 net rental returns have been calculated by soil mapping unit by Kansas Agricultural Statistics Crop Reporting District as directed by PVD. Returns are calculated for both native and tame pasture.

SOIL MAPPING UNITS AND GRAZING INDICES

Dr. Paul Ohlenbusch, Extension Specialist, Range and Pasture Management, Department of Agronomy, Kansas State University in cooperation with the Natural Resource Conservation Service (NRCS) developed the Grazing Index for each soil mapping unit (soil type) for both native and tame pasture. Each soil mapping unit has a productivity value associated with it. This value is a measure of the forage producing capacity of the soil. Many factors affect plant growth and forage production. Some of the factors considered are weather, soil characteristics (depth, texture, slope, fertility, moisture holding capacity), and plant growth and development.

The weighted average Grazing Productivity Index was calculated for each district using the Grazing Index and the pasture acreage by soil mapping unit. The weighted average Grazing Productivity Index was used to normalize (index) the Grazing Productivity Index by soil mapping unit. Thus, the soils of average productivity in the district should correspond with an indexed value of 1.0. Actual acreage by soil mapping unit by county was provided by the Division of Property Valuation.

The Grazing Land Index

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Grazing land is Kansas' second largest agricultural land use. As a resource, grazing land supports the beef and sheep industries, provides habitat for wildlife, and provides surface water to streams. The future of Kansas grazing lands is in the hands of its owners and operators. Many of the owners and operators manage the land based on tradition and nontechnical information. The owners and operators who use this style of management often feel they are doing what is correct. However, most of these people are producing at a level below the land's potential or have allowed the original potential to be replaced by vegetation that produces below the original vegetation's potential.

The Grazing Land Index is the result of an ongoing educational effort to help producers better understand the carrying capacity. The original rangeland database was developed from the long-term clipping database developed by USDA National Resources Conservation Service (NRCS). This database also was used by NRCS to develop Range Site Descriptions for their use.

The definitions for terms used are found at the end of this discussion.

To develop an index for use in property valuation for taxes, three basic assumptions were used:

1. A single level of potential must be used for each type of grazing land.
2. The level selected must be attainable by a reasonable individual with an average knowledge of the management requirements of the type of grazing land they use.
3. The future of the grazing land's potential must be a consideration in the process.

To develop the index, two existing databases together with published soil surveys were used as the basis. The current listing of soil series by county was obtained from the National Resource Conservation Service (NRCS) and combined with a rangeland carrying capacity database developed by Kansas State University Extension and NRCS personnel in the mid-1980's. The carrying capacity database was based on NRCS Range Site descriptions which are a part of the standard materials maintained in field offices. The Range Site Descriptions are based on extensive long-term clipping studies. The studies are a standard procedure based on clipping existing vegetation on representative range sites in different conditions to determine the dry matter produced. The soil surveys provided the basis for the tame pasture data. In addition to the following basic requirements, the index assumes that average grazing management is used.

Rangeland is evaluated based on an ecological classification system developed 50-60 years ago. The classification system is based on plant succession which states that plant species change in response to external factors. The major natural factors are drought, grazing, and fire. Following settlement, fire was virtually eliminated as a factor and is not a consideration in the index. Today, management is the dominant factor. The rangeland was indexed at a "good" condition class which, based on research and experience, is considered to be the most profitable condition level to manage plus it can maintain and/or improve the resource.

Tame pasture was indexed based on a moderate level of fertilization and management for the area. Research and experience has shown these levels to be economical with minimum inputs. The potential of the resource can also be maintained.

Some types of grazing land are found in limited amounts and should be handled on a case-by-case basis. These include irrigated pasture (several species and mixtures), eastern gamagrass, and native pastures (including pure stands of big bluestem, Indiangrass, switchgrass). The productive potential of these varies with location in the state, soil series, and level of management.

Definitions:

Rangeland - The native grazing lands that existed before settlement or that have been revegetated with similar species. Four basic types exist in Kansas: tallgrass prairie, mixed grass prairie, sand prairie, and shortgrass prairie.

Tame pasture - Primarily introduced grass species that are planted and managed with agronomic practices (seeding, fertilizer, etc.). The major species are smooth bromegrass, tall fescue, and bermudagrass. More recently, native species have been planted using similar practices with similar performance characteristics.

Carrying capacity is based on the amount of dry matter available and what can be harvested. It is measured in Animal Unit Months (AUM) per acre (AUM/a).

Animal Unit Month (AUM) is the average amount of forage required for an Animal Unit (AU) for 30 days.

Animal Unit (AU) is based on a 1,000 pound mature cow of above average milking ability and a calf, 3-4 months post-partum that weans at 400 pounds.

Range site is a soil series or group of soil series with similar species composition, dry matter production, and management requirements.

RENTAL RATES

Cash rental rates are used to calculate the gross receipts the grassland will generate. Individual rental rates were used for each of the nine Kansas Agricultural Statistics Crop Reporting Districts. The cash rental rates for grassland are normally published each year in "Agricultural Land Values", an annual publication of Kansas Agricultural Statistics. This publication lists only one cash rent for all grassland; it does not provide separate cash rents for native and tame grass. In previous years, the same cash rental rate was used for native rangeland and tame pasture since the adjustments for productivity were already made with stocking rates; fertilizer costs were excluded for this reason.

However, with the changes in the derivation of the grazing productivity index (previously stocking rate), separate cash rents were necessary in order to continue excluding fertilizer costs.

The Department of Agricultural Economics, Kansas State University, conducted a pasture

size and cash rent survey of Kansas Livestock Association Members, County Appraisers, and County Agricultural Extension Agents during the summer of 1998. From the survey, separate average cash rents for native and tame grass were determined for the nine KAS reporting districts, and from these cash rents, the ratio of the tame to native cash rent was determined. Using the number of acres in native grass, tame grass, and total grass as provided by PVD, the cash rents ratios from the survey and the KAS published all grass cash rents, individual weighted average cash rents for native and tame grass were determined for all nine crop reporting districts. Cash rent ratios from the 1998 Pasture Survey were related back to the published KAS cash rents in order to preserve the use of the published data source. Results from this survey were used in the 1998 calendar year data.

Kansas Agricultural Statistics conducted a survey during 1998, The 1998 Pasture Survey, and the results of this research were used in determining the cash rent ratio and separate cash rents in the 1998-00 calendar year data. Kansas Agricultural Statistics conducted a new survey during 2002, The 2002 Pasture Survey, and the results of this research were used in determining the cash rent ratio and separate cash rents in the 2001-04 calendar year data. In 2005, KAS again conducted a pasture survey, and the results of this survey were used in determining the cash rent ratio in the 2005 calendar year data.

GROSS RENTAL INCOME

The gross rent per acre was calculated by multiplying the indexed productivity for each soil mapping unit by the 2005 district rental rate. This yields the indexed gross rental income in \$/acre, which represents the rental value of the differing productivity levels for each soil mapping unit within the district. The gross rent was calculated individually for the native range and tame pasture soil mapping units.

EXPENSES

Three types of expenses were researched for the 2005 pasture and rangeland analysis. They were general maintenance expenditures, ownership costs associated with fences, and the costs of providing water to livestock. The procedures were the same for native and tame grasses and did not vary across soil mapping units. Fertilizer costs for tame or cool season grasses are not relevant given the separate cash rents for the grasses.

Maintenance Costs

The first cost studied was annual maintenance costs per acre. Joe Harner, Extension Agricultural Engineer, Department of Biological and Agricultural Engineering, Kansas State University, stated that annual maintenance charges for a pasture are estimated by agricultural engineers to be 2.5% of the initial cost of a fence. This figure includes fence maintenance, brush control, and burning costs. These are typical costs for a pasture, but they are difficult to gather and are highly variable. Specifically, the costs can be either extremely high or nearly non-existent. Little maintenance occurs in many pastures across the state because many landowners are hesitant to invest additional capital to improve pastures, or they will force the tenant to incur these expenses as part of the lease agreement. Conversely, other landlords will choose to or are forced to spend significant amounts of money to repair fences, ponds, etc. Again, these types of costs vary

considerably.

In previous years, the recommendation from Agricultural Engineering of 2.5% of the initial fence cost has been used as the maintenance cost. Results of the 2005 Pasture survey suggested that maintenance costs were roughly closer to 6.5% of the initial fence cost. Thus, for the 2005 calendar year net returns, 6.5% of the initial fence cost was used as the maintenance cost.

Fence Ownership Costs

The second expense investigated was the annual cost of fence ownership. The annual ownership cost of a durable asset normally includes depreciation, interest, repairs, property taxes, and insurance (DIRTI five). For this study (Use Value Appraisal), property taxes, repairs, and insurance are handled elsewhere in the analysis. Thus, depreciation and interest costs comprise the ownership cost for the durable asset, the fence in this case. Therefore, these costs were calculated for fences on a per acre basis.

Fence costs on a per acre basis vary greatly, depending on the size of the pasture. A small pasture has a large number of feet of fence per acre relative to a large pasture. For example, a 20 acre pasture has approximately 99.0 feet of fence/acre, while a 640 acre pasture has roughly 24.75 feet of fence per acre assuming that the landowner only has responsibility for 50% of the perimeter fences and 100% of any cross-fences. In short, the per acre costs are greater for a small pasture relative to a larger pasture. The feet of fence on a per acre basis also varies with the shape of the pasture. This is a problem when developing net rental amounts on a per acre basis. Thus, the 2005 Pasture Survey was used to determine a representative pasture size and associated required feet of fence for each of the nine KAS crop reporting districts. The survey asked respondents about the typical pasture size and the feet of fence they have. From the results, the mode, or most frequently occurring, pasture size was selected for each district. Using only those surveys with the mode pasture size, the average feet of fence for that pasture size was determined. Subsequently, all other survey information from that district was excluded from the analysis. Once a mode pasture size was established for a district, only the surveys with the corresponding pasture size from that district were analyzed.

The number of feet of fence per acre were calculated for the representative pasture size by district as determined in the 2005 Pasture Survey assuming that the landowner was responsible for 50% of all perimeter fences and 100% of any cross-fences. Once the feet of fence per acre was known, a cost per foot of fence was needed to calculate the fence cost per acre. The cost per foot of fence was calculated for the typical fence type of the typical pasture size for each district. The typical fence type per district was determined from the 2005 Pasture Survey results. Data for the mode pasture size by district was used to determine three general fence types using the mode wire type (4 or 5), mode post type (steel, treated, combination), mode post spacing, mode cross-fence use, and mode fence life. The cost per foot of fence was calculated for the three general fence types. They were:

- Type 1: Wire Fence with Gate, 1/4 Mile Long
- Type 2: Wire Fence with Gate, 1/2 Mile Long
- Type 3: Wire Fence without Gate, 1/2 Mile Long

The fence types represent different lengths of fence (1/4 and 1/2 mile), with and without gates. The purpose of three fence types was to determine a cost per foot for fences with varying characteristics.

Type I fences are used for 80 acre pastures and smaller. Type II fences are used for pastures ranging from 81 to 320 acres.

Forty-three suppliers of fencing materials across the state were contacted to determine the costs for posts and barbed wire in 2005. Labor charges for constructing fences and setting corner posts were determined through conversations with custom fence builders, suppliers, and from Kansas Custom Rates, an annual publication of Kansas Agricultural Statistics. These expenses are detailed in the appendix.

The cost per acre of a fence was then derived using the following formula:

$$\frac{\text{Feet of Fence per Acre} * \text{Cost per Foot of Fence}}{\text{Total Fence Cost per Acre}} =$$

These costs are in 2005 dollars and were used in the 2005 valuation. These costs are indexed by the Producer Price Index in off-survey years, such as the 2006 values data. The annual ownership cost of the fence, which includes depreciation and interest, was then determined. PVD directed KSU to only utilize 50% of these amortized fence ownership costs.

Livestock Watering Costs

In previous years, PVD directed Kansas State University to include \$1.00 per acre for the cost of providing water to livestock. This includes items such as ponds, stock tanks, wells, windmills, spring developments, and hauling water. KSU conducted research related to many of these topics; however, the costs are highly variable depending on weather, location, pasture size, government cost-sharing, etc. Watering costs were re-examined and requested in the 2005 Pasture Survey conducted by Kansas Agricultural Statistics. The survey data also suggested that watering costs are roughly \$1.00 per acre, thus, \$1.00 per acre was used as the cost of providing water to livestock on all pasture.

MANAGEMENT FEE

A management fee is calculated to account for the costs associated with business and managerial decisions. The fee is 10% of the gross rent per acre, which is consistent with the current rates charged by farm management and consulting firms in Kansas. The 10% fee was verified by ten firms and is supported by Kansas State University management fee surveys conducted in 2005, 2001, 1998, 1994, and a 1990 survey that investigated farm management practices and fees in Kansas.

LANDLORD NET RENTAL INCOME

The landlord's share of net rental income was determined by combining the previously explained factors into a system of equations. PVD directed that the 2005 calendar year landlord net rental income for pasture and grassland be calculated by soil mapping unit. The grazing productivity index for each soil mapping unit was indexed based on the weighted average productivity rate for the district. The Indexed Landlord Gross Rental Income by soil mapping unit was determined by multiplying the district average cash rent by the indexed productivity rates. The maintenance costs, fence ownership costs, and livestock watering costs, as well as the 10% Management Fee, were then subtracted from the Indexed Gross Rental Income to determine the 2005 Landlord Net Rental Income. This was done for both Native and Tame grasses. Net returns for tame grass were not generated for Districts NW-10, WC-20, and SW-30 since almost no tame acres exist in these districts.

