

TAXING FEEDLOTS IN ALBERTA: LETHBRIDGE COUNTY'S TAX ON CONFINED FEEDING OPERATIONS

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SUMMARY

Lethbridge County introduced a new business tax on confined feeding operations (CFO), notably feedlots, in 2016. It was expected to bring in \$2.5 million for county road maintenance in 2017. However, the tax could have a detrimental impact on feedlot owners and is not the fairest way to amass revenue for road repairs.

Four criteria can be used to evaluate a particular form of taxation. They are fairness, efficient resource allocation, compliance and administration costs, and revenue stability. This paper examines the potential impacts of the tax and proposes three alternative methods for financing Lethbridge County road maintenance that meet those criteria. These alternatives create less of an impact on feedlot owners and share the tax burden more equitably. They also reduce the potentially negative ripple effects that the CFO levy may have on feed producers, cattle producers, meat packers and consumers.

The current tax is based on livestock storage capacity, rather than on production volume. It's counter-productive in the long run because the feedlot's fixed costs of production are increased, while its variable costs remain unaffected. This permanent increase in fixed costs, estimated to be as high as 20 per cent of the average operating margin per head of cattle, lowers the return on feedlot investments. Thus, the new tax could result in some feedlots being closed for lack of a high enough return on investment.

A more equitable revenue source for road maintenance would be user fees imposed on the trucking industry. This system is already in use in Oregon and New Zealand.

[†] As part of a road improvement initiative, Lethbridge County introduced a business tax on confined feeding operations in 2016. That new and controversial tax led to our investigation. Funding for this research project was provided in part from the Alberta Cattle Feeders Association (ACFA) and the Alberta Beef Producers. This School of Public Policy paper summarizes the analysis and conclusions reported in a more detailed discussion paper that is available from the authors upon request. We would like to thank Bryan Walton and Casey Vander Ploeg of ACFA; Rick Robinson, Jennifer Place and Les Whitfield of Lethbridge County; Brenna Grant and Brian Perillat of Canfax; Rich Smith of the Alberta Beef Producers; Sheila Young of Alberta Municipal Affairs and James Rude of University of Alberta for providing data, comments and advice on this project. We also extend our gratitude to the many people in other provinces and states who gave generously of their time to discuss relevant features of taxation in those jurisdictions. We are solely responsible for the analysis and recommendations and any errors or omissions.

It uses GPS technology to track trucks on the roads and then charges the trucking companies a fee based on road use. It would certainly be worthwhile for the province to initiate a pilot program to test the system's efficacy on Alberta roads.

Lethbridge County could also implement a usage levy that would be based on how much it spends on roads, combined with a feedlot's capacity plus its distance from a provincial highway. Contributions to road maintenance would thus be directly tied to road usage. The new CFO tax does not distinguish between feedlots with a heavy use of county roads and those that don't use the county roads as much because they are close to provincial highways. The current CFO levy creates an unfair distribution of the tax burden. Under a usage-levy system, 94 feedlots, or 72 per cent of feedlots in the county, would have their tax burdens lessened, while 18 feedlots located on provincial highways would pay no tax.

The third option would be a tax based on an equation of how many livestock per feedlot exceed the actual capacity of that farm's own crops to feed them. Those feedlots relying more heavily on trucked-in crops, and thus dependent on greater use of county roads to feed their animals, would pay higher taxes accordingly.

The three alternatives would generate the same amount of revenue as the current levy and with similar degrees of predictability. However, these alternatives are fairer, more equitable and more efficient than the CFO levy. In the interests of maintaining both county roads and a healthy feedlot industry, Lethbridge County should replace the CFO levy with one of them.

1. INTRODUCTION

In 2016, Lethbridge County introduced three new taxes to assist in financing improvements to county roads. The three taxes are a tax on gravel hauling, a special tax on farmland, and attracting the most attention, the business tax on confined feeding operations (CFOs). The revenues from the new taxes, once fully implemented in 2017, are projected to be approximately \$0.1 million, \$0.926 million and \$2.474 million respectively.¹ The CFO business tax is particularly controversial as it is a new tax, expected to generate a significant amount of revenue, and is aimed at the CFOs in the county. With the concentration of cattle feeding in Lethbridge County, the impact of the tax on that sector is particularly important.

The Lethbridge County initiative is the latest iteration in efforts to address the lingering concern that property taxation in rural Alberta does not deal appropriately with different types of agricultural enterprises. Aside from residences, which are taxed separately, only agricultural land is subject to tax, but a variety of (intensive agricultural) enterprises use little land while having substantial investments in buildings and/or livestock and large sales. Such is the case with CFOs, which typify the problem. When there is a relatively limited investment in land (and so little paid in property taxes), those enterprises may be benefiting disproportionately from local municipal services compared to their contribution to the cost of those services. Cattle feeding operations are a common example in part because they are the prevailing form of CFO in many areas. Lethbridge County is a notable example.²

In this paper, we analyze the impact of the introduction of the CFO business tax on the cattle feedlot industry in the county and propose three alternatives that we feel are more in line with the criteria of fairness, efficient resource allocation, compliance and administration costs, and revenue stability. In Section 2, by way of background, we summarize our separate assessment of Lethbridge County's fiscal situation, paying particular attention to expenditures on road maintenance and the trend in the level and composition of the property taxes levied by the county. In Section 3, we take up the challenging task of analyzing the impact of the CFO business tax on the feedlot and related industries. The complex inter-relationships of the feedlot industry with the other markets – local, national and international – make it difficult to derive definitive conclusions. In Section 4, we propose three alternatives to the CFO business tax that we think are more in line with the criteria of fairness, allocative efficiency, costs of compliance and administration and revenue stability. These three alternatives to the CFO business tax are: (a) a system of road user fees based on modern GPS to be funded in part by the province; (b) a usage levy based on a feedlot's capacity and its distance from provincial highways; and (c) a production equivalent property levy, with animals taxed based on the difference between the amount of land required to feed them and a feedlot's land holdings. In Section 5, we review and compare selected other proposals. Section 6 contains a summary of our analysis and conclusions regarding the impact of the CFO business tax and alternatives to it.

2. LETHBRIDGE COUNTY'S FISCAL SITUATION³

The county has justified the introduction of three new taxes to assist in financing improvements to its roads. The three taxes are a tax on gravel hauling, a special tax on farmland, and the largest and

¹ These new taxes were challenged in court. On April 18, the court ruled against the special tax. Lethbridge County amended its taxes for 2017 to remove the special tax (but to raise the regular tax rate on farmland an approximately equivalent amount) and to set the business tax on confined feeding operations at \$2.50 per animal unit rather than at the \$4 per unit planned for 2017 and down from the \$3 per unit level charged in 2016. Those changes came after our analyses were completed. Hence, the analysis in this paper is based upon the taxes as introduced and planned for in 2016.

² For some historical perspective, see the 2002 report of the MLA Farm Property Assessment Review Committee (<http://municipalaffairs.alberta.ca/documents/as/FarmReport02.pdf>).

³ This section summarizes the more detailed analysis of Lethbridge County's fiscal situation in Dahlby, McMillan and Khanal (2017).

attracting the most attention, a business tax on confined feeding operations (CFOs). Roads are the major cost of rural municipalities, representing about half of outlays. Of 11 southern Alberta rural municipalities, Lethbridge County maintained the fifth lowest number of kilometres of roads but had the third highest expense per kilometre of road maintained in 2014.

Property taxes are the county's largest own-source revenue and are almost half of total revenue. After being quite stable for a number of years, county property taxes increased after 2002 from \$553 to \$966 per capita by 2014 in 2002 dollars. County property taxes also rose as a percentage of household income over those years, from 1.65 to 2.37 per cent.

Property taxes are collected from four (in this analysis) classes of property. Those are residential, farmland, MELR (machinery and equipment, linear property and railways) and other land and improvements.⁴ In Lethbridge County in 2014, residential property generated 29 per cent of the county's property taxes, farmland 20 per cent, MELR 24 per cent and other 27 per cent. Over the past decade, the residential share has been decreasing somewhat, the farmland share has been relatively stable and the non-residential/non-farm (MELR and other) portion increasing slightly.

In addition to municipal taxes, the province levies a provincial education tax on property to support schooling. The provincial property tax has declined in importance since it was introduced in 1996 (replacing local school taxes). In Lethbridge County, the provincial school tax amounted to half of total property taxes in 1996, but by 2014 it had declined to 26 per cent. The reduction in the schooling/provincial component of property taxes has afforded considerable tax relief to property tax payers in Lethbridge County as elsewhere in the province. In Lethbridge County, total property taxes rose only \$157 per capita (2002 dollars) between 1996 and 2014, with county taxes increasing \$375 but with provincial school taxes declining by \$218. As a percentage of household income, total property taxes in the county in 2014 were lower than in 1996 – 3.21 per cent versus 3.82 per cent. The shift in the property tax burden relative to income has not been uniform among property classes. Property taxes on residential property have been almost constant. MELR and other land and improvements have experienced some reduction, but farmland property taxes have declined from 0.97 per cent of average household income to 0.55 per cent.

Farmland, particularly, has benefited from provincial school tax policy. The reason is that farmland assessments are regulated and have not changed since 1986.⁵ Other property, such as residential, is assessed at market value (or an estimate based on cost and depreciation). Because the provincial school tax rate is the same for farmland and residential property, the farmland share of the school tax declines as the residential tax base grows while the farmland base remains constant. The rural municipalities may offset the constant farmland tax base by levying a higher tax rate on farmland. That is the case in Lethbridge County where the farmland tax rate has grown to about 4.6 times the residential rate. As a result, the share of the county's property tax revenue generated by farmland has been relatively stable at about 20 per cent although the farmland assessment is essentially constant and its share of the overall property tax base has been steadily declining.

Compared to nearby rural municipalities, farmland property taxes in Lethbridge County are relatively high. As a percentage of the equalized assessed values, the farmland property tax rate is 1.775 per cent in Lethbridge County.⁶ This is the highest rate among the feedlot concentrated

⁴ MELR is primarily associated with the energy and utility industries (e.g., wells, pipelines and transmission lines and related equipment). Other land and improvements are primarily commercial and industrial properties excluding MELR property.

⁵ The average equalized assessment per acre of farmland in Lethbridge County is, and has been since 2002, about \$222 per acre. This value is well below market value. With market values of about \$2,100 per acre in 2002, farmland was assessed at only 10.6 per cent of market value and that percentage has slipped to 6.4 per cent in 2015 as market value has increased to about \$3,500 per acre.

⁶ Equalized assessments are used to compare assessed values across municipalities. Municipal assessments can differ somewhat from the provincial standards (e.g., market value) in a given year. The province uses equalized assessments to ensure that for provincial taxation purposes, properties of a similar type across the province are assessed on a fully comparable basis.

municipalities, which averaged 0.884 per cent and higher than the 1.054 average rate in the southern Alberta municipalities in the study comparator group.⁷ Only one of those rural municipalities had a higher effective rate. Thus, the effective rate levied in Lethbridge County is 1.68 times and 2.01 times the average rate in the two groups respectively. Farmland quality (assessment per acre) influences effective tax rates but it appears that a county's non-residential/non-farm property share of total equalized assessment is a major determinant. The greater the non-residential/non-farm share, the lower the effective farmland tax rate. Lethbridge County, with a low non-residential/non-farm share (40 per cent versus the 56 per cent average), has a comparatively high tax rate.

Expenditures vary widely among southern Alberta rural municipalities. For example, road expenditures per kilometre averaged \$5,044 but ranged from \$2,420 to \$8,351 and total expenditures per capita averaged \$3,839 but ranged from \$1,944 to \$6,447. Comparatively, Lethbridge has been a modest spending municipality with per-kilometre road expenditures at 74 per cent of the average and per person total expenditures at 67 per cent of the average. Econometric analyses were used to explain inter-municipal variations. Variation in non-residential/non-farm property taxes is a major determinant of the variation in expenditures, and Lethbridge County has a relatively small commercial/industrial tax base. In addition, investigation of Lethbridge County's road expenditures indicated that annual expenditures were less than annual amortization; that is, the county was recently spending less on its roadways than required to maintain its roadway capital.

Our overall assessment is that Lethbridge County is in a sustainable fiscal position, with relatively low levels of debt. The recent operating deficits and the high ratio of amortization to capital expenditures (revealed in the data up to 2014) may indicate a problem in maintaining current infrastructure without either further revenue increases or expenditure cuts in other areas. Property taxes rates on farmland are high compared to other municipalities in southern Alberta, but road expenditures per kilometre and total expenditures per person are relatively modest.

3. IMPACT OF THE BUSINESS TAX ON CONFINED FEEDING OPERATIONS IN LETHBRIDGE COUNTY⁸

Alberta is the centre of beef production in Canada, with 70 per cent of fed cattle output, but the market for cattle and beef is highly integrated with that in the United States so conditions on both sides of the border (and regulations at the border) influence production and processing. Feedlots' costs are dominated by the cost of feeder cattle and the cost of feed, which typically make up 85 to 90 per cent of total cost. Feeder cattle prices are determined largely by the price of fed cattle and the price of grain, but other costs matter. Feedlots in Lethbridge County account for about 35 per cent of Alberta's fed cattle and so an equivalent share of the demand for feeders. This is a large component of the Alberta/western Canadian demand. The Lethbridge County feedlots require large quantities of barley to finish cattle – perhaps about one-quarter of the Alberta barley crop – and essentially all of that needs to be imported from outside the county. (Feedlot feed requirements exceed the crop production of the county of which barley is a modest component). Again, there is competition from cattle and other livestock producers for that grain. Transportation costs of feed grains are significant and local grain and silage producers may be willing to accept a lower price in

⁷ Canfax feedlot capacity figures show feedlots concentrated in the following rural municipalities: Foothills, Lethbridge, Mountain View, Newell, Rocky View, Taber, Vulcan, Warner and Wheatland. In 2011, those municipalities were the home of 57 per cent of Alberta's yearling feeders. Canfax reports that 73 per cent of Alberta's feedlot capacity is in those nine municipalities. The comparator municipalities are those located in southern Alberta near Lethbridge County: Acadia, Cypress County, County of Forty Mile, County of Newell, Pincher Creek, Taber, Vulcan County, County of Warner and Willow Creek.

⁸ This section summarizes the more detailed analysis of the market for feeder cattle and the incidence and impact of the CFO levy in Dahlby, McMillan and Khanal (2017).

order to avoid shipping their products to feedlots outside Lethbridge County. However, local feed producers can access other markets and have some flexibility in selecting the crops that they raise, which would limit the degree to which the tax could be shifted back to them.

In this section, we consider where the burden of Lethbridge County's CFO levy might fall. Will feedlot owners bear it? Or will it be shifted forward to the purchasers of fed cattle, ultimately to the consumers of beef, or backward to the suppliers of inputs to the industry – the feeder cattle producers and the feed grain and forage producers? The size and complexity of the beef/cattle markets make predicting the impacts of Lethbridge County's levy on feeder cattle very difficult, but this is the challenge we take up next.

3.1 The Base and the Magnitude of the Tax

The initial step in determining the impact of Lethbridge County's tax on intensive livestock operations and, in particular, the cattle feeding sector is to establish the base and the magnitude of the tax. The tax is on the livestock storage capacity of confined livestock operations as established by the Natural Resources Conservation Board (NRCB). These storage capacities are those that the NRCB permits primarily for environmental management purposes – that is, effluent and manure disposal management and odor/nuisance management.⁹ The NRCB permits facilities for a specific maximum number of livestock on site by type and those can be converted to animal units where 1.0 animal units are the equivalent of a dry (not lactating) dairy cow.¹⁰ Once fully implemented in 2017, the tax per animal unit capacity is to be \$4.

A simple example facilitates assessing the impact of this tax on feeder operations and the broader agricultural sector. It is assumed that the feedlot takes in 900-pound steers and sells finished cattle of 1,300 pounds; that is, producing 400 pounds of gain. Each feeder is the equivalent of 0.9091 animal units. With a feedlot at capacity processing one feeder per year, the business tax amounts to \$3.64 per feeder ($\4×0.9091). In other words, a feedlot with a capacity for 10,000 feeders (a permitted capacity of 9,091 animal units) would pay \$36,364 per year in the CFO tax. Typically, feedlots process more cattle annually than the one-time lot capacity as the time on feed is usually only several months. Heavy feeders might be finished in as little as four months. Allowing for feeding two lots of cattle annually, the business tax per feeder fed becomes \$1.82 ($\$3.64/2$). Data suggest that feedlots feeding heavy feeders function at about 75 per cent of capacity.¹¹ At that level and with two lots fed annually, the CFO tax amounts to \$2.43 per head ($\$3.64/1.5$). Other data suggest that 60 per cent of capacity is the operating level.¹² If so, the tax amounts to \$3.03 per animal fed. Clearly, the cost per feeder depends upon the throughput of the feedlot.

The magnitude of the tax per animal fed might range from \$1.82 to \$3.03, depending on capacity utilization, but an important point to stress is that the tax depends on the rated capacity of the feedlot and not on the volume of production. Thus, the tax increases the fixed costs of the feedlot,

⁹ See the NRCB website at <https://cfo.nrcb.ca/QuickLinks/AbouttheRegulationofCFOs.aspx>.

¹⁰ For confined beef feeding operations, 3.6 feeder calves (<550 pounds), two feeders (450-900 pounds) and 1.1 cows/finishing feeders (900+ pounds) are the equivalent of one animal unit. Animal unit conversion rates for various types of livestock (e.g., beef, dairy, hogs, chickens, etc.) and classes of each are available at <http://www.lethcounty.ca/government/funding-our-future/funding-options>.

¹¹ A study by Serecon Services reports the inventory of heavy feeders to be 72.3 per cent of the NRCB-permitted number in 2011. Also, the inventory data indicate that 900+ pound feeders made up 83.5 per cent of the cattle on feed and 90.2 per cent of the animal units. See Serecon Services, *Economic Impact of Agriculture in Lethbridge County, September 2014* (Appendix B). NRCR data provided by Lethbridge County report 93.9 per cent of the beef cattle animal units permitted were for 900+ feeders.

¹² Derived from 2015 Canfax reports of cattle sold relative to bunk capacity. See Canfax Services, *Historical Reports of Cattle on Feed* (e.g., <http://www.canfax.ca/Report/downloads/COF/201501cof.pdf>). A recent Canfax Research Services (2016) study indicated "fill rates" in finishing feedlots of 69 per cent to 88 per cent. In that study, reference was also made to typical turnover rates in the range of 1.5 to 2.0.

but does not affect the variable costs of production, i.e., cost of feeding an additional animal. Because the tax is a fixed cost, it should not affect operators' production decisions in the short run. However, a permanent increase in fixed costs will reduce the return on the investments in feedlots and some operators may close their feedlots because their operations do not generate a high enough return on investment.

The feedlot industry is a competitive industry, and firms will enter the industry if the expected, risk-adjusted rate of return on their investment is greater than or equal to what they could earn in other sectors. Alternatively, firms will leave the industry if the expected risk-adjusted rate of return on investment is less than what could be earned by investing capital in other sectors of the economy. Entry and exit occurs until the marginal feedlot operation just earns this competitive risk-adjusted rate of return. For the marginal producer, the operating margin per fed steer just equals the fixed cost per fed steer, where fixed costs include property taxes and a required return on the investment in the feedlot.¹³

To put the increase in fixed costs from the business tax in perspective, we need to compare it with the feedlots' operating margins. Net income and profit figures are not well documented, and due to substantial variations in fed cattle prices and input prices (notably feeder cattle and feed), they vary considerably over time. If the long-term average operating margin in feedlots in Alberta is \$18 per head sold, a figure advanced by the Alberta Cattle Feeders Association (ACFA), the \$1.82 to \$3.03 increase in fixed costs per head would be 10 to 17 per cent of average operating margin.¹⁴ If \$18 per head is the average operating margin for all feedlots, some feedlots would have a smaller operating margin and those may be the ones most vulnerable to the new tax.¹⁵

The fact that the CFO business tax is a fixed cost, not a variable cost, has important implications for its impact on the industry. It means that the response to the tax will be on the extensive margin; that is, on the number of feedlots that will operate in the county in the long run. In other words, it means that the main supply response to the business tax will be the closure of some of the existing feedlots. As well, because it is an increase in fixed costs and not variable costs, it does not affect the operating margin, and therefore the production of the feedlots that continue to operate will be largely unaffected.¹⁶ However, those feedlots that continue to operate will earn lower profits and returns on their investments.

The number of feedlot closures and the decline in fed cattle production is difficult to predict because it depends on two unknowns. One is the number of feedlots, and their average production, that would be rendered unprofitable if the fixed cost per animal increased by \$1.82 to \$3.03. As far as we know, there are no data on the distribution of the operating margins of feedlots in Lethbridge County or the rest of the province. It is therefore impossible to predict the number of closures or the magnitude of reduced output. Second, the feeder industry is interconnected with other markets, and the reduction in production of fed cattle in Lethbridge County may affect the market price for fed cattle, the price of feeder cattle and the price of feed grain and forage. For example, to the extent that a reduction in the demand for feeder cattle by feedlots in Lethbridge County causes the price of the feeder cattle to decline, some of the burden of the business tax will be shifted to the cow-calf operators. In terms of our framework, the decline in feeder cattle prices would increase operating margins and reduce the adjustment of the output of the feedlot industry. Reductions in the price of

¹³ The required rate of return on investment in fixed assets is an opportunity cost and this is why it can be considered part of the fixed cost of a feedlot.

¹⁴ The Canfax Research Services (2016) study reports a 1996-2015 average margin of \$9.70 and a 2011-2015 margin of \$60.84.

¹⁵ Even a small tax relative to total costs or even value added may have a noticeable effect upon an industry when the margins are small. In this case, a tax in the \$1.82 to \$3.03 range per head amounts to 0.34 to 0.56 per cent of value added, assuming 400 pounds of gain per head in a feedlot at recent prices.

¹⁶ Some feedlot operators may increase their capacity utilization in an effort to reduce somewhat the increase in the fixed cost per head due to the CFO levy. Those adjustments are likely to be small and only enable a small reduction in the increased fixed cost per head.

feed grains and forage would have similar effects. In the next sections, we consider the impact of a reduction in feedlot production on their input suppliers and downstream markets for fed cattle and the beef processors.

Two final points should be made before taking up those topics. First, if the CFO business tax were replaced by an increase in the tax on farmland, including a higher tax on the land that the feedlots occupy, there will be an increase in the fixed costs of the feedlots. Some feedlots may close and the production of fed cattle will decline. The magnitude of the response would differ from that under the CFO business tax because the distribution of the land tax increase among the feedlots would be different. Second, the increase in spending on county roads that is to be financed by the CFO business tax (or an alternative farmland property tax increase) will improve the productivity of the transportation industry which serves the feedlot industry. These productivity improvements should be reflected over time in lower transportation costs of the animals and feed for the feedlot industry. This will help to increase operating margins and offset some of the negative effects of the business tax.

3.2 Shifting the Tax to Feeder Cattle Producers

Feeder cattle and feed represent the major costs – approaching 90 per cent of the cost of a finished animal by some estimates – and the feeder animal is the larger component.¹⁷ If the CFO tax causes the feedlot industry to shrink, resulting in a reduction in the demand for feeder cattle, some of the burden of the tax may be borne by the cow-calf operators in Alberta through a reduction in the price of feeder cattle. An important feature of the beef market is that the North American market is highly integrated. While Alberta producers account for about 70 per cent of Canada's fed cattle production, conditions in the United States market are a major determinant of the Alberta price and the Canadian market. The prices of feeder cattle in Alberta are closely linked to the prices of feeders in the U.S., and Alberta producers ship significant numbers of feeders to the U.S. each year. Access to the large U.S. market is an advantage for Canadian producers, but it does mean that assessments of possible tax shifting must recognize that the industry's supply-demand forces are much broader and more complex than the situation in Alberta or Canada. That is, though significant, Alberta is but one sector of a much larger market. The option of shipping Alberta feeders to the U.S. means that it is unlikely that a significant amount of the CFO tax will be shifted to Alberta cow-calf operators.

The local nature of the tax will constrain the potential shifting of the tax from Lethbridge County feedlots. As Lethbridge County is the only county government to introduce this tax (so far), feedlot operators in other rural municipalities are not experiencing that cost increase. On the other hand, feedlot operations are concentrated in Lethbridge County. According to the 2011 Agricultural Census data, 25 per cent of Alberta's yearling steers and heifers on feed were located in Lethbridge County.¹⁸ Even among the nine rural municipalities in which cattle feeding is concentrated, Lethbridge County housed one-third of the yearling feeders in 2011.¹⁹ Clearly, Lethbridge County has some advantage as a location for cattle feeding. Still, feedlot operations there must bid for

¹⁷ See, for example, Canfax Research Services, International Cost of Production Analysis, January 2013 (<http://www.canfax.ca/Samples/Feedlot%20COP%20Analysis.pdf>). The feeder versus feed distribution of the cost depends upon various factors but particularly upon the age of the animal put on feed. To illustrate, the feeder might represent 55 per cent of total costs and feed 30 per cent.

¹⁸ Canfax feedlot (one-time bunk) capacity data indicate that over one-third of Alberta's feedlot capacity is in Lethbridge County. That measure, however, focuses on finishing feedlots versus those growing or backgrounding light feeders. Also, Canfax's data exclude feedlots having bunk capacity for fewer than 1,000 head.

¹⁹ Canfax feedlot capacity figures show feedlots concentrated in the following rural municipalities: Foothills, Lethbridge, Mountain View, Newell, Rocky View, Taber, Vulcan, Warner and Wheatland. In 2011, those municipalities were the home of 57 per cent of Alberta's yearling feeders. Canfax reports that 73 per cent of Alberta's feedlot capacity is in those nine municipalities.

feeders in the Alberta and western Canadian market. Lethbridge County accounts for only about one per cent of the Alberta beef cow population and even the nine major cattle feeding municipalities have about 20 per cent of Alberta's beef cow herd. Feeder cattle must be purchased from suppliers across the province and from out-of-province suppliers. As well, Alberta feedlots must compete with U.S. buyers. While Lethbridge County feedlots are a major segment of the market for feeders, at least two-thirds of the market is elsewhere and much of that is in southern Alberta and near Lethbridge County. A reduction in the demand for feeders by Lethbridge County feedlots may exert some downward pressure on the price of feeders, but even if so, the effect of the CFO business tax will be difficult to discern.

In that context, it is interesting to consider the impact on feeder prices if all the tax were shifted back to the suppliers of the feeder animals. Taking the average of the mid-point price in the ranges reported for the Ponoka and Strathmore markets for the week of Oct. 28, 2016 for 800- to 900-pound steers, the price of a 900-pound feeder steer would be \$1,386 (900 x \$1.54/lb.). If the reduction in the demand for feeders caused the price of feeders in Alberta to fall by the full amount of the tax, the cost of the feeder would be reduced by between 0.13 per cent (1.82/1,386) and 0.22 per cent (3.03/1,386) using the per-head levies calculated in Section 3.1.

3.3 Shifting the Tax to the Feed Producers

Feed is a major cost for cattle feedlots. A reduction in the number of feeders on Lethbridge County feedlots would reduce the demand for, and perhaps the price of, feed because of the CFO business tax. If this reduced the price, it would result in some shifting of the tax to the feed suppliers. An important consideration is how large Lethbridge County production is in this market. Lethbridge County's share of the Alberta output of grain and hay is small and Lethbridge County is a net importer of feed grain because of the concentration of feeding operations there. That is, the grain necessary to supply the feedlots there exceeds the production of all grains in the county (even ignoring exports). The feedlot demand might even approach twice the local production. Hence, there is a large demand for feed grains in the county that relies upon supplies from elsewhere. If feed grain imports equal one million tonnes of barley,²⁰ that represents 24.2 per cent of Alberta's 2014 barley production and 36.6 per cent of that in southern Alberta. Although those are notable shares, there are also substantial demands outside Lethbridge County. While Lethbridge County accounts for 36 per cent of Alberta's large feedlot capacity, there is also a substantial feedlot demand, let alone the demands of other livestock feeding elsewhere in the region and the province. In addition, if some of the tax burden were shifted to feed producers, those farmers have some capacity to shift production from barley to other crops to counteract those efforts. Wheat and canola are notable options but there is a range of other possibilities (e.g., dry peas, beans, lentils, etc.). Shifting the tax to feed producers is likely to be difficult although there may be some possibility, at least initially and in local markets.

Even if the tax were fully shifted to feed producers, the price reduction would be difficult to detect given the many forces affecting feed prices and their volatility. For example, feed barley prices in Lethbridge averaged \$278.92 per tonne in 2012-2013, \$187.24 in 2013-2014 and \$200.76 in 2014-2015 (Alberta Agriculture and Forestry, 2016). In addition, the variations in weekly prices at each of the destination points are often \$5 per tonne, more or less. Area prices are influenced by regional variations in demands, supplies and qualities, much of which may be influenced by area weather. The variations in prices illustrate the difficulty in determining any tax burden shifting that might be due to the CFO tax.

²⁰ This is a lower end estimate of total feedlot requirements and makes some allowance for other feeding requirements in the county and for barley exports. For details, see sections 4.4 and 6.3 of Dahlby, McMillan and Khanal (2017) which is available from the authors upon request.

3.4 Shifting the Tax to Beef Processors

Consideration must be given to the possibility that the CFO business tax might be shifted forward to the processors of beef through an increase in fed cattle prices and, perhaps, ultimately to the consumer. However, our analysis suggests that the possibility is remote. While the beef packing industry is highly concentrated, with two plants in Alberta accounting for two-thirds of the beef packing capacity in Canada, the integrated Canadian and U.S. markets for slaughter cattle and beef means there is little scope for shifting the tax. The potential for forward shifting the CFO tax would require a significant reduction in the aggregate supply of fed cattle in Alberta and that appears unlikely to occur, at least in the short run. Given the variation in prices, costs, exchange rates and margins over the past 20 or more years and the relative stability of supplies (even given the cattle cycle), it seems most likely that the effect of the CFO tax on fed cattle prices, and the price of beef to consumers, would be negligible.

4. RECOMMENDATIONS FOR POLICY REFORM

In this section, we propose three alternatives to the CFO business tax in Lethbridge County. The criteria that economists use to evaluate tax systems are fairness, allocative efficiency, compliance and administrative costs, and stability and predictability of revenue. The benefit principle – those who receive greater benefits from public services should contribute more towards their cost – is the relevant fairness criterion for evaluating the CFO business tax, and this naturally suggests that a system of user charges be adopted to help pay for the maintenance of the county's roads. We consider three alternatives to the CFO business tax: (a) modern GPS technology to implement road user charges, as a pilot project to be funded in part by the province; (b) a usage levy based on both a feedlot's capacity and its distance from provincial highways; and (c) a production equivalent levy, with animals taxed based on the difference between the amount of land required to feed them and the feedlot's land holdings. A summary and discussion of these proposals concludes this section.

4.1 Charging for the Use of County Roads

There have been important technological advances in container and freight tracking, including truck monitoring. Current location-based technology has made truck route adherence monitoring and electronic toll payments feasible (Avante). The technology exists that would allow the trucking industry to automatically prepare payments to governments for the use of roads, streets and highways based on weight, location and distance travelled.

In Canada, Shaw Tracking already provides customized GPS fleet tracking services to trucking and cargo businesses (Shaw Tracking, 2017). New Zealand and Oregon have adopted vehicle user charges based on weight and distance travelled and they have adopted these automated systems for collecting the user fees.²¹ Firms such as EROAD have developed this technology, which can be adopted by the trucking industry and governments to implement real-time, location-specific charges for the use of streets, roads and highways.²²

The existence of this proven off-the-shelf technology means that it would be possible to introduce a system of user fees for the trucking industry to pay for the use of Lethbridge County's roads. There would be many technical and regulatory issues to be addressed, and the provincial government would have to play an important role in the adoption of the user charges in the county. However, the use of municipal roads, especially by the oil and gas industry, the high cost of maintaining

²¹ For a description of the New Zealand system of vehicle user charges, see <https://www.nzta.govt.nz/assets/resources/road-user-charges/docs/road-user-charges-handbook.pdf>

²² For a demonstration of the technology, see <http://www.eroad.com/>. The EROAD system can be used by the trucking industry in Oregon to pay for the state's vehicle user charges.

the roads and the inefficient use of property taxes to pay for these expenditures, are major issues throughout Alberta. An innovative vehicle user fee policy in Lethbridge County would have broader benefits to the province and other municipalities in demonstrating how the technology could be applied at the municipal level, and perhaps ultimately at the provincial level. We recommend that a vehicle user-fee system be adopted in Lethbridge County, as a pilot project, with significant financial and regulatory support from the Alberta government.

A modern vehicle user-fee system would be entirely consistent with the benefit principle. By charging for the use of county roads, it would price the use of the county's infrastructure, creating the appropriate incentives for the efficient use of the road system by industry and a means of paying for it. A user-fee system would increase the variable costs of production of the feedlots in line with the increased costs that they imposed on the road system when increasing the output of their feedlots. Those feedlots that place greater reliance on the county's road system because of their location would pay more, and there would be an incentive to expand or open new feedlots that economize on the use of the road system. A vehicle user-fee system would involve the adoption of new technology but these would be largely one-time fixed costs. Demonstrating the use of this technology in the county would reduce the costs of adoption for other municipalities if they choose to follow a successful application in Lethbridge County. Finally, the revenues generated by the user fees would vary with the use of the road system by the trucking industry in the county. This would vary with the required maintenance expenditures and therefore would be closer to the county's costs.

4.2 A Levy Based on the Cost of Maintaining County Roads and a Feedlot's Road Usage

Although a system of user charges, based on global positioning systems and cellular technology, is the preferred option for paying for the cost of maintaining the county's roads, the adoption of the system would require the Alberta government's financial and regulatory support. If this is not forthcoming, some alternatives to the CFO business tax should be considered. Below we provide an estimate of the total expenditure on the county's roads that can be attributed to the feedlots located in the county and a procedure for allocating these costs among the feedlots based on both their capacity and distance from provincial highways.

The Dahlby, McMillan and Khanal (2017) analysis of expenditures on roads by the municipalities in southern Alberta indicated that, given the county's road-related operating expenditure plus capital additions per kilometre and other characteristics, Lethbridge County would spend \$4,392 per kilometre of roads. There are 143 feedlots in Lethbridge County that are subject to the CFO levy, and our analysis indicates that the average distance of a feedlot from the nearest highway is 2.74 kilometres. The total distance from all feedlots to provincial highways is 392 kilometres. If all of the expenditure on maintaining these roads were attributed to the feedlots, the total amount would be $\$4,392/\text{km} \times 392 \text{ kms}$ or \$1,721,444. This is \$540,520 or about 25 per cent less than the \$2,261,964 that Canfax Research Services (2016) estimates that the beef feedlots will pay in CFO business tax in 2017.

Although a feedlot's capacity affects its usage of the roads, the feedlots located closer to the provincial highways will haul animals and feed over shorter distances on the county's roads. From this perspective, a measure of road usage that combines capacity and distance to provincial highways is a better indicator of road usage than capacity alone. Just as the airline industry uses passenger-miles as a measure of travel volumes, a feedlot's capacity-kilometres could be used as a measure of its potential use of the county's road system.

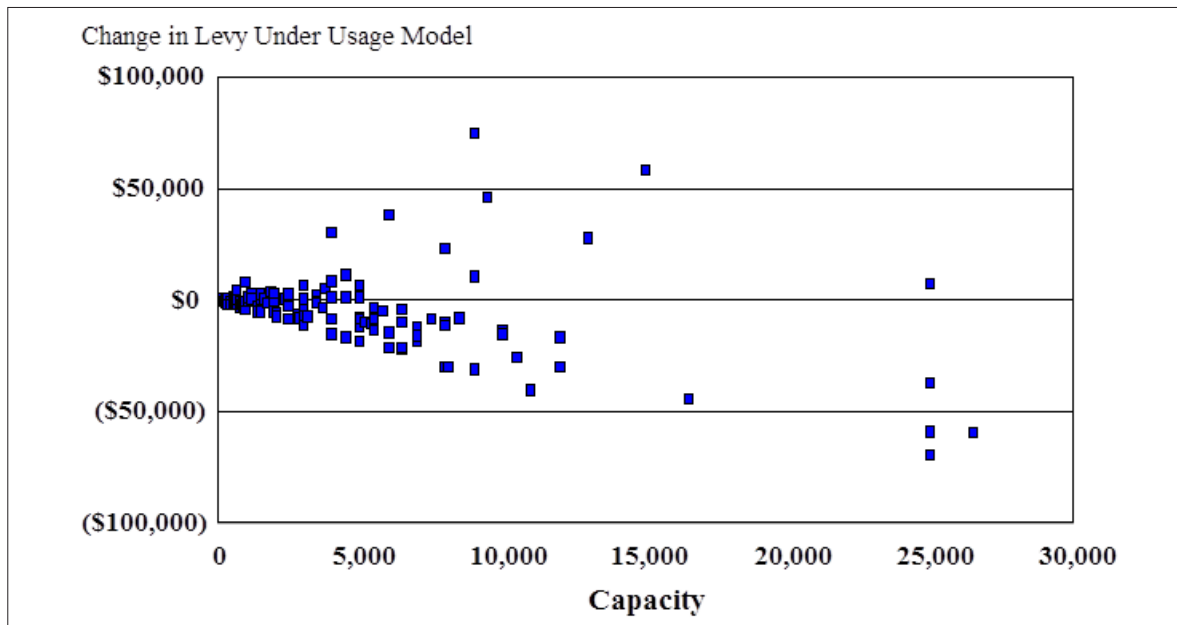
Combining our estimate of the cost of maintaining the county roads with a capacity-kilometres measure of an individual feedlot's usage of the road system, we can calculate the total tax or levy that could be attributed to each of the 143 feedlots in the county. Figure 1 shows the change in the total tax burden on each of the 143 feedlots compared to the CFO levy in 2017. Overall, 94

feedlots, representing 72 per cent of the total feedlot capacity, would see their tax burdens reduced if the CFO business tax were replaced with a usage charge based on animal-kilometres and our estimate of the expenditure that the county is expected to incur in maintaining its roads. Note that 18 feedlots, representing nine per cent of total feedlot capacity, are located on provincial highways and would not pay any levy based on an animal-kilometres measure of usage. While such feedlots undoubtedly use the roads to some extent, their farmland property tax payments can be considered their contributions to maintaining the county roads.

Nine feedlots would pay over \$10,000 more under the usage fee model than under the CFO levy and one feedlot would pay almost \$75,000 more. These feedlots are on average 9.2 kilometres from a provincial highway and would pay more than under the CFO levy, but these feedlots place higher demands on the county road system and should make correspondingly larger contributions to their maintenance.

A usage fee based on an estimate of the county’s expenditures on roads and an animal-kilometre measure of usage is more aligned with the benefit principle than the current CFO business tax. It would not be more complicated to administer than a levy based on capacity alone. Overall, usage fee based on estimates of the per-kilometre cost of maintaining roads in the county and animal-kilometre measure of a feedlot’s usage of the roads would be superior to the CFO business tax because it would be closer to the benefit principle.

FIGURE 1 THE CHANGE IN THE TAX BURDEN ON FEEDLOTS WITH THE USAGE FEE MODEL



4.3 A Production Equivalent-Based Tax on Cattle Feeders

In this section, we propose an approach to property taxation that would encompass CFOs in a manner that relates to the productive value upon which agricultural land taxation is now based. It is illustrated in the context of cattle feedlots. This suggestion builds upon the conventional local property tax system operating in Alberta municipal districts and may relate less well to actual use of county roads than the preceding user charge proposals. On the other hand, it may approximate or parallel to some degree the footprint approach advanced in the MLA Farm Property Assessment Review Committee (2002) report.

The taxation of farmland has merit when farm output is directly related to farm acreage; that is, output is that produced entirely on the farm. CFOs may diverge from that model. In particular, cattle feedlots very often rely heavily upon purchased inputs – notably feeder cattle and feed – and have a volume of output far beyond what is (or could be) produced on the enterprise’s farmland acreage, and especially on the feedlot acreage itself. This suggestion is directed at relating farm enterprise municipal taxes to the scale of the farmland required to sustain the enterprise’s output.

An analysis of barley production in Lethbridge County reveals that the yield from one acre of barley is (essentially) sufficient to put 500 pounds on a heavy feeder.²³ Now extend the one-acre-finishes-one-feeder benchmark to a 1,000-acre farm. The output of that farm might be sold as grain, it might be fed to livestock and sold to packers or the output might be some combination of the two. Keeping the example simple, the farm might produce 73,300 bushels of barley, or it might feed all that barley and finish 1,000 head of cattle, or some mix of the two. In Lethbridge County, the 1,000-acre farm would pay \$5,800 in municipal property taxes.²⁴ Many/most people would not be concerned about the fairness of the property tax whatever output choice the farmer made between grain and cattle.

However, if the farmer chose to finish 5,000 head of cattle, questions may be raised. Under standard municipal taxation, the farm would continue to pay \$5,800 in property tax but would purchase an additional 4,000 head of feeders and also purchase an additional 293,200 bushels (6,384 tonnes) of barley beyond that raised on the farm to feed the extra livestock. This operation now appears to be more of a CFO operation, and it is likely to raise some questions (about relative contributions to road and perhaps other costs, and about tax fairness) among neighbours operating more conventional farms.

The CFO feedlot operation puts additional demands on the municipality, notably on its roads. The farm with the CFO feedlot puts more demand on the road system in volume of traffic and in the tonnage moved. For example, the 5,000-head feedlot will move four times more grain (i.e., the purchased feed) on the roads than the 1,000-acre grain farm. No additional mileage is needed but there will be more wear and tear, thus higher maintenance costs and very likely a greater investment required in the road system’s load-bearing capacity. The degree of additional cost associated with a suitably maintained and upgraded road system is an engineering question for which there is no answer here. However, for illustration, an estimate of the additional cost is \$1.45 per head based on a 5,000-head feedlot resulting in a doubling of municipal road costs relative to those associated with a 1,000-acre grain farm.²⁵

The principle here is that an agricultural operation pays the standard farmland tax provided its livestock output (e.g., number of fed cattle) does not exceed the land’s productive capacity, but once livestock output exceeds productive capacity, a charge is levied (e.g., per head or, more generally, per animal unit) on the additional output. To illustrate, refer to a 1,000-acre farm with varying numbers of feeder cattle. Such a situation is depicted in Table 1 for cattle feeding on the farm ranging from zero to 5,000 head per year. Farmland property taxes are \$5,800 and the per-head levy (on “extra” stock) is \$1.45. If the farmer feeds no cattle and sells all his grain, only the

²³ Barley production in Lethbridge County has averaged 73.3 bushels per acre. Feed conversion data indicate that 74.35 bushels are sufficient to generate 500 pounds of gain on a heavy feeder. Conversion is based on 7.14 pounds of feed per pound of gain which comes from Canfax Research Services, Feedlot Analysis, January 2013 and which is consistent with data from Alberta Agriculture.

²⁴ In Lethbridge County, the average assessment of cultivated land is \$287/acre (547,868 acres with an assessed value of \$157,272,000). At a mill rate of 20.2026, the average tax per acre is \$5.80.

²⁵ A CFO feedlot may impose some additional costs beyond those of the roadway system on the municipal government. For example, environmental costs, fire/police/emergency services, and costs associated with greater employment in the municipality. For rural municipalities, however, those costs are expected to be modest compared to the added roadway expenditures (as road services are normally the majority of municipal district outlays) so the \$1.45 used here is based on an assumption of the impact on road costs.

property tax of \$5,800 is paid. Similarly, if feeding up to 1,000 head annually (the maximum that could be fed using only on-farm feed production), the animal tax is not charged (i.e., it is exempted or forgiven) and only a land tax of \$5,800 is paid. However, once the operator begins feeding more cattle than the on-farm feed production will support – that is, feed must be purchased – a per-animal tax of \$1.45 per head begins. So, if a total of 2,000 head are fed, an animal tax of \$1,450 is payable for the additional 1,000 head of feeders, making the total municipal tax bill \$7,250 (\$5,800 land tax and \$1,450 animal tax). Similarly, as the scale of the feeding operation expands, the animal tax and the total tax increase.²⁶ The largest scale shown here is for 5,000 head annually, in which case the total tax is \$5,800 for land tax and \$5,800 for animal tax for a total of \$11,600.²⁷

TABLE 1 LOCAL TAXES ON A 1,000-ACRE OPERATION WITH VARIOUS SCALES OF CATTLE FEEDING UNDER THE PRODUCTION EQUIVALENCE CONCEPT

Number of Cattle Fed Annually	Land Tax	Exempted/ Forgiven Animal Tax	Animal Tax Paid	Total Tax
0	\$5,800	\$0		\$5,800
500	\$5,800	\$725		\$5,800
1,000	\$5,800	\$1,450	\$0	\$5,800
2,000	\$5,800		\$1,450	\$7,250
3,000	\$5,800		\$2,900	\$8,700
4,000	\$5,800		\$4,350	\$10,150
5,000	\$5,800		\$5,800	\$11,600

It is conceivable that some feedlots might attempt to circumvent or reduce the animal unit tax by inflating the amount of farmland owned, by adding owners to the feeding operation who own farmland. Such problems seem avoidable if the animal tax exemption is allocated according to the ownership shares of the feedlot. For example, were a 5,000-head feedlot without associated farmland to add a co-owner with 5,000 acres of farmland acquiring a one per cent interest in the feedlot, that farmer would (following the example in Table 1) get credit towards his/her farmland tax of \$72.50 (5,000 x 1% x \$1.45), leaving the feedlot owners with the 99 per cent share to pay \$5,727.50 in animal tax. The potential problem could be further reduced if the ultimate test is, assuming first that the land is in the county: Does the land owned provide feed to the feedlot and if so, how much? That is, the animal tax would be exempted to the extent that the farmland provides feed to the feedlot. For most feedlots, the feedlot-farmland linkage is likely clear and, in more complicated cases, honesty is expected to prevail. Questions may arise in a small number of cases but a few audits should sort out those instances and clarify the criteria.

5. DISTRIBUTION OF AGRICULTURAL SECTOR TAXES UNDER ALTERNATIVE PROPOSALS

Lethbridge County has introduced new taxes on the agricultural sector. That has led to a number of suggestions as to how tax revenues might be raised or allocated. It is useful to note the various ideas and to compare the tax distribution implications of the proposals that exist or have emerged. Table 2 below shows the distribution of taxes within the agricultural sector. Prior to the new

²⁶ As outlined, this tax is a variable cost to the feedlot operator. However, monitoring the volume of cattle fed could be an administrative problem. If so, the tax might be based on feedlot capacity as is the current CFO business tax. In that case, the tax becomes a fixed cost. On the other hand, tax allowances have been made when utilization deviates significantly from capacity.

²⁷ Obviously, this illustration is simple to extend. For example, if 10,000 head were being fed, the animal tax would be \$13,050 [$\$1.45 \times (10,000 - 1,000)$].

business tax initiative, all the tax on the farm sector was on farmland and it generated \$3.177 million in property tax. With the new funding initiative, in 2017, the special tax on farmland yields \$0.926 million and the CFO business tax is expected to generate \$2.474 million. Thus, the distribution of the total \$6.578 million in those taxes in 2017 is expected to be 62.4 per cent on farmland and 37.6 per cent on CFOs. The new taxes increased the agricultural sector's contribution to total county property taxes from 22.2 per cent to 37.2 per cent.²⁸

TABLE 2 DISTRIBUTION OF AGRICULTURAL SECTOR TAXES ACROSS FARM PROPERTY TYPES IN LETHBRIDGE COUNTY UNDER ALTERNATIVE ASSUMPTIONS (PERCENTAGE)

	Lethbridge Co. 2015	Lethbridge Co. 2017	Canfax Margins		Road Share (km)	Farm Improvements Taxed	Production Equivalent
			20 year	5 year			
Farmland	100.0	62.4	77.3	47.4	80.6	90.1	?
CFO (business tax)	0.0	37.6	22.6	52.6	19.4	0.0	?
Improvements	0.0	0.0	0.0	0.0	0.0	9.9	0.0

The Alberta Beef Producers (ABP) contracted Canfax Research Services (2016) to study a range of approaches to taxing intensive livestock operations. Of those examined, the ABP favours allocating the agricultural sector taxes according to the (net operating income) margins in the different operations. Canfax Research Services examined the impacts based on margins over 20 years (1996-2015) and over a recent five-year period (2011-2015). While it was suggested that the margin principle be used only for allocation of the \$3.4 million of new taxes, it seems more appropriate, if margins are the basis, to consider (as done here) applying the implied distributions to the total taxes on the farm sector. On the basis of 20-year margins, the distribution would be 77.3 per cent on farmland and 22.6 per cent on CFOs. That changes substantially if the five-year margins were applied, in which case the allocation is almost half and half (specifically 47.4:52.6). Depending on the margin period, this implies that the feedlot CFOs contribute between \$1.485 and \$3.46 million towards road financing by the agricultural sector.

This study suggested an allocation based on a feedlot's road usage. Information on the distance of feedlots from provincial highways reveals that the average feedlot is 2.74 kilometres from the nearest provincial highway. In total, that amounts to 392 kilometres of county roads, which represent 19.4 per cent of the county's road system. A simplistic distance-only attribution of feedlot benefits to those roads – that is, for example, attributing no benefits to others, ignoring the CFOs' heavy utilization of those roads and neglecting non-feedlot CFOs – implies that the feedlot/CFO sector meets 19.4 per cent of the taxes and farmland the other 80.6 per cent. The 19.4 per cent translates to \$1.276 million.

Farm improvements (i.e., primarily buildings excluding residences) are not assessed or taxed in rural municipalities in Alberta. Our review of farm property taxation in a number of provinces and states indicated that assessing and taxing farm improvements is the norm. If improvements were subject to property tax (and there was no CFO business tax), the agricultural tax base would be expanded and CFOs would be part, but an unknown part, of that addition. In Manitoba, where improvements are taxed, farm improvements are assessed at \$1.84 billion and farmland is assessed at \$16.78 billion. If a similar balance existed in Alberta, in particular in Lethbridge County, farmland would bear 90.1 per cent of the agricultural property taxes and improvements 9.9 per

²⁸ The agricultural sector refers to agricultural enterprises (i.e., excluding farm residences). Note too that farm improvements (beyond residences) are not now subject to property tax by rural municipalities in Alberta.

cent. What CFOs would represent of total improvements is not known but CFO improvements would be only a portion of the total. It appears that expanding the farm property tax base to include improvements would not go far in addressing Lethbridge County's concerns.

Finally, the production equivalent tax approach was suggested. However, lacking information on the amounts of farmland associated with feedlots, the distribution of the tax under that approach cannot be estimated. Nevertheless, to afford comparability with other farming operations, discounting CFO taxes according to the animal unit feeding capacity of the associated farmland seems a reasonable consideration. The moderation of the property taxes on farm residences according to the acreage of the farm unit is a rather comparable treatment.

6. SUMMARY AND CONCLUSION

Lethbridge County is a centre for beef production. Feedlots in Lethbridge County account for about one-third of Alberta's fed cattle, with Alberta accounting for 70 per cent of Canada's fed cattle output. Feeders and the feed that they consume (approximately the equivalent of the county's total crop output) are almost all imported into the county. Hence, cattle feeders put significant demands on county roads. Concern for the funding of needed road improvements led Lethbridge County to introduce new taxes in 2016, including a tax on confined feeding operations (CFOs) of which about 90 per cent is paid by beef feeders. As a new and novel tax, the CFO business tax of \$3 in 2016 (with \$4 planned for 2017) per animal unit of capacity, attracted much attention and considerable resistance, and led to this and other studies.

Our overall assessment is that Lethbridge County is in a sustainable fiscal position, with relatively low levels of debt. While the county property tax burden (property taxes relative to household income) has been increasing, the total (county and provincial school) property tax burden has fallen as a result of declining school property taxes (a policy benefiting property tax payers across the province). Farmland taxes in the county (and province-wide) have benefited particularly from the lower school taxes although farmland taxes have provided a relatively constant 20 per cent share of county property taxes. The effective rate of farmland property taxes in Lethbridge County is relatively high compared to those in surrounding rural municipalities. Part of the reason for that is that the county has a comparatively low business (i.e., non-farm/non-residential) tax base. Expenditures, both total per capita and road expenditure per kilometre (the major expenditure item), are modest in that they are notably below the average of the neighbouring rural municipalities. Expenditures on roads (as revealed in the data up to 2014) indicate that – because there is a high ratio of amortization to capital expenditures – there could be an emerging problem in maintaining current infrastructure without either further revenue increases or expenditure cuts in other areas. Prior to 2016, the only component of agricultural operations subject to county taxes was farmland. In contrast, estimates of potential road usage reveal that the feedlot traffic equals or exceeds that of crop producers in the county.

Lethbridge County introduced three new taxes in 2016 in an effort to finance road improvements. When fully implemented in 2017, the taxes were expected to generate \$0.1 million from that on gravel hauling, \$0.926 million from a special farmland tax and \$2.474 million from the CFO business tax. The CFO business tax is \$4 (in 2017) per animal unit of storage capacity as defined by the NRCB. As a heavy feeder (the size of animals dominating county feedlots) represents 0.9091 animal units, the tax translates to \$3.64 per head of capacity. Allowing for feedlot turnover/utilization, the tax would be reduced to \$1.82 to \$3.03 per head fed annually. Given utilization, the tax depends on the rated capacity of the feedlot and not on the volume of production. As such, the tax increases a feedlot's fixed costs of production but does not affect the variable costs of production. Because the tax is a fixed cost, it should not affect operators' production decisions in the short run. However, a permanent increase in fixed costs, which may be in the range of 10 to 20

per cent of the average operating margin per head, will reduce the return on feedlot investments; thus some Lethbridge County operators may close their feedlots because their operations do not generate a sufficiently high return on investment.

The impact of the tax on feeding operations may be moderated if the tax is shifted to some degree to others. That is, the introduction of the tax on CFOs may impact other prices in upstream and downstream markets. Feedlot costs are dominated by the cost of feeder cattle and the cost of feed. Lethbridge County cattle feeders represent about one-third of the Alberta demand for feeder cattle and require about one-quarter of the Alberta barley crop for feed so changes there appear to have some potential to affect these input markets. However, beef production is a highly competitive industry. That is so within Alberta and Canada and also because the market for cattle and beef is highly integrated with that in the United States. Similarly, the market for feed is very competitive. A decline in the production of fed cattle in Lethbridge County would reduce the local demand for feeder cattle (ultimately impacting cow-calf producers) and for feed grain and forage. However, the suppliers in these markets have alternative sources of demand elsewhere in the province, as well as export markets, or may turn to producing alternative crops. Furthermore, as the tax is currently only applied by Lethbridge County, the potential for backward shifting to input producers is reduced (and more so if feeding operations shift towards neighbouring counties). Transportation costs for producers, however, are significant and that means that sales to Lethbridge County feedlots are attractive for nearby feeder cattle and feed grain producers, and a reduction in the local demand may have some impact on prices in the local market. Overall, the competitive nature of the input suppliers and the complexity of those markets (as well as the beef market) make tracing the impacts and possible shifting difficult.

The potential for shifting any of the tax forward onto processors or consumers appears slim. Especially with access of cattle and feed to the U.S. market, the markets are competitive and a very significant reduction in the supply of fed cattle would be required to produce an upward movement in prices of fed cattle and beef.

While the treatment of CFOs under Alberta's property tax system is widely seen as advantageous to intensive agricultural enterprises, we are not convinced that the Lethbridge County CFO business tax is the most appropriate solution. Hence, we have proposed three alternatives to the CFO business tax, which we think are more in line with standard tax criteria (notably fairness and allocative efficiency).

One alternative is the adoption of modern technology to implement a system of user fees for the trucking industry to pay for the use of Lethbridge County's roads. This would require significant financial and regulatory support from the government of Alberta. However, the successful adoption of an innovative vehicle user-fee policy in Lethbridge County would have broader benefits to the province and other municipalities in demonstrating how the technology could be applied at the municipal level, and perhaps ultimately at the provincial level. Such systems are already operating in Oregon and New Zealand. We recommend that a vehicle user-fee system be adopted in Lethbridge County, as a pilot project, with significant financial and regulatory support from the Alberta government.

The second alternative, should provincial support not be forthcoming, would be the adoption of a usage levy based on the county's expenditures on roads, the capacity of a feedlot and its distance from provincial highways. The current CFO business tax makes no allowance for differences among feedlots in their use of county roads (i.e., in their distance to provincial highways). This raises questions about the fairness of the distribution of the CFO business tax burden among the county's feedlots. Combining our estimate of the cost of maintaining the county roads with a capacity-kilometres measure of individual feedlots' usage of the road system, we find that 94 feedlots, representing 72 per cent of the total feedlot capacity, would see their tax burdens reduced. Eighteen feedlots, representing nine per cent of total feedlot capacity, are located on provincial

highways and would not pay any levy based on a capacity-kilometres measure of usage. Nine feedlots would pay over \$10,000 more under the usage fee model than under the CFO levy and one feedlot would pay almost \$75,000 more.

Our third alternative is a refinement of the Lethbridge County CFO business tax. Under it, a CFO would be taxed only to the extent that the number of livestock exceeds the productive (feeding) capacity of the CFO's farmland. This alternative is based on the premise that farmland taxation as used in Alberta is best suited for an environment in which crops produced on farms are sufficient to support the livestock outputs of the farm. The current tax system is not suited for taxing CFO operations and so results in inequities among municipal taxpayers when they range from grain farms to mixed (grain and livestock) farms to CFOs such as large feedlots. The proposal is a blend of a farmland tax and a tax on animals. Animals would be taxed to the extent that the numbers exceed the scale that farm crops could feed the numbers of animals being produced (which is notably more in the case of, or at least certain types of, CFOs). The tax on animals should be calculated to cover the additional costs that the CFOs impose on the municipality. In the case of feeding operations, and especially cattle feedlots, the additional demands are primarily on the load-bearing quality and the maintenance of the roads although other services may be impacted. Studies are required to determine the additional costs attributable to CFO enterprises. A simple example suggests that a doubling of road costs due to an intensive cattle feeding operation could mean an animal tax of \$1.45 per head of feeder cattle beyond the productive capacity exemption.

Our overall assessments of the current CFO levy and the three alternatives proposed in this paper are summarized in Table 3. These assessments are based on our view of the degree to which the proposals are consistent with or violate the four criteria that economists use to evaluate tax systems. While our assessments are necessarily subjective, they are supported by discussion in the previous sections of the paper.

TABLE 3 EVALUATION OF THE CFO AND THREE ALTERNATIVE METHODS OF FUNDING ROAD MAINTENANCE IN LETHBRIDGE COUNTY

	Criteria			
	Fairness Based on the Benefit Principle	Efficiency in the Allocation of Resources	Compliance and Administration Costs	Stability and Predictability of Revenues
Current CFO Levy	<p style="text-align: center;">+</p> <p>Feedlots in general will bear more of the cost of maintaining roads in the county.</p>	<p style="text-align: center;">-</p> <p>Does not vary with road usage by individual feedlots. Entry or exit of feedlots not based on cost of road maintenance.</p>	<p style="text-align: center;">+++</p> <p>Data on capacities of feedlots are readily available. Feedlots will know their payments based on their capacities.</p>	<p style="text-align: center;">++</p> <p>Annual revenue is predictable. Could result in reductions in some revenue fluctuations as feedlots open or close.</p>
Charging for the Use of County Roads	<p style="text-align: center;">+++</p> <p>Contributions to maintenance of the roads would be in line with use of the roads.</p>	<p style="text-align: center;">+++</p> <p>New feedlots and existing feedlots would take into account the cost of maintaining roads in making investment decisions.</p>	<p style="text-align: center;">--</p> <p>Significant start-up costs for governments and the private sector in adopting the GPS tracking and billing systems.</p>	<p style="text-align: center;">++</p> <p>Revenues would vary with road usage and therefore be consistent with required road maintenance expenditures by the county.</p>
Levy Based on the Cost of Maintaining County Roads and a Feedlot's Road Usage	<p style="text-align: center;">++</p> <p>Closer alignment of payments for use of roads than under the current CFO levy.</p>	<p style="text-align: center;">+</p> <p>Decision to enter or exit feedlot industry would be based in part on cost of road maintenance.</p>	<p style="text-align: center;">++</p> <p>Data on capacities of feedlots and distance to provincial highways are readily available. The cost of maintaining roads can be estimated with existing data. Feedlots will know their payments based on their capacities.</p>	<p style="text-align: center;">++</p> <p>Annual revenue is predictable. Could result in reductions in some revenue fluctuations as feedlots open or close.</p>
A Production Equivalent-Based Tax on Cattle Feeders	<p style="text-align: center;">+++</p> <p>Consistent with existing farm property taxation (e.g., of grain and non-intensive feeding operations). Additional taxes only on intensive feeding operations exceeding productive capacity of farmland, i.e., those imposing extra costs.</p>	<p style="text-align: center;">++</p> <p>Additional cost only on those operations imposing extra costs on roads. Those operations will recognize the extra costs and take account of them in decision-making.</p>	<p style="text-align: center;">++</p> <p>Volume of cattle fed is simple to determine especially if based on feedlot capacities as now. Determining the farmland associated with a feedlot would be an added administrative exercise initially. In some cases, that determination could be somewhat complicated but a pro-rating method based on ownerships of feedlot and land can solve it.</p>	<p style="text-align: center;">++</p> <p>Annual revenue is predictable. Some variation as feedlot and/or cattle numbers change.</p>

In our view, our three alternatives to the current CFO levy are fairer (more consistent with the benefit principle), would promote a more efficient allocation of resources in the feedlot sector and would conserve the use of the road system. The CFO levy may be simple to administer but that is only a slight advantage over a levy based on the cost of maintaining county roads and a feedlot's road usage or a production equivalent-based tax on cattle feeders. (The main drawback with charging for the use of roads based on GPS technology is the high initial costs of the trucking industry and the municipality or province adopting the system). The CFO levy and our three alternatives could generate the same revenues with similar degrees of predictability. All in all, we feel that there are viable alternatives to the current CFO levy that are superior in terms of equity and efficiency, and Lethbridge County should seriously consider adopting one of them in place of the current CFO levy.

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