The Impact of a Mill Policy to Discourage Overweight Log Trucks

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ABSTRACT: *In Jan. 2002, Rayonier adopted a new truck weight policy at their Georgia mills to discourage gross overloading of trucks. Under this policy, logging contractors were paid a minimal amount per ton for weights exceeding 44 tons. To evaluate the effectiveness of this policy, we compared the weights of all trucks delivering wood to three company mills in Jan. 2001 (before the new policy) with the weights of all trucks delivering to the same three mills in Jan. 2002 (the first month the policy was used). This policy was very effective in a short amount of time. The percentage of trucks with gross vehicle weights exceeding 44 tons dropped from 5.56 to 3.01% after the new policy took effect and this improvement was seen within a week. We also observed other improvements in trucking performance. The percentage of loads within 5% of the legal limit increased from 45.8 to 57.4% through dramatic reductions in the percentage of underloaded trucks. In fact, after the new policy took effect, average gross vehicle weight and the average truck payload both increased due to this reduction in the percentage of underloaded trucks. South. J. Appl. For. 28(3):132–136.*

Key Words: Log trucking, truck payloads.

Trucking is often the most expensive activity associated with the harvest and transportation of raw material to woods products facilities. Trucking cost per unit depends on the distance traveled and the time it takes to make the delivery as well as the amount of wood delivered with each load. Logging contractors have little control over the distance they must travel to market or the unloading times they face at mills. However, they can exercise some control over how quickly they load their empty trucks in the woods and how much wood is loaded on each truck.

Truck payload is generally limited by the empty or tare weight of the highway rig and the maximum gross vehicle weight (GVW) allowed by state and federal laws. Payloads may also be constrained by the dimensions and form of the wood being hauled. Short, fast-taper stems or very crooked stems often make it difficult to create maximum payloads. At times, the product forms (tree-length, random-lengths, etc.) accepted by the mills also pose challenges. Beardsell (1986) examined ways to decrease the cost of timber hauling through increasing truck payloads. He suggested first finding ways to reduce the variability of truck GVW. Many efforts have pursued this goal since that time, but much improvement remains to be achieved.

Most log trucks in the southern United States leave the woods without being weighed. The gross vehicle weight is estimated by the loader operator and/or truck driver based on the number of logs, the height of the load on the trailer, and the weight of recently delivered similar loads of wood. As a result, the GVW and the associated payload vary with each truck delivery. Shaffer et al. (1987) explored the utility of using electronic scales on logging tractor-trailers with two logging contractors in Georgia and Virginia. They found the use of these scales reduced the payload weight variance by 0.52 and 1.14 tons with internal rates of return of 24.3 and 9.3% to the two cooperating contractors.

Overboe et al. (1988) examined the impact of providing logging contractors with detailed information feedback on their load weights to see if that improved their ability to reduce load variability and overloading. They observed small, positive changes in performance due to the greater information feedback. Since the cost of this approach was very small, they suggested the cost/benefit ratio would be positive, although it was not directly measured.

Another approach used to maximize truck payloads has been the reduction of truck tare weight. McNeel (1990) described the steps taken by one logging contractor in the South to reduce the tare weight of his fleet and the returns that it produced. Stuart (1995, 1996) also illustrated the importance of reducing rig tare weight and ensuring that

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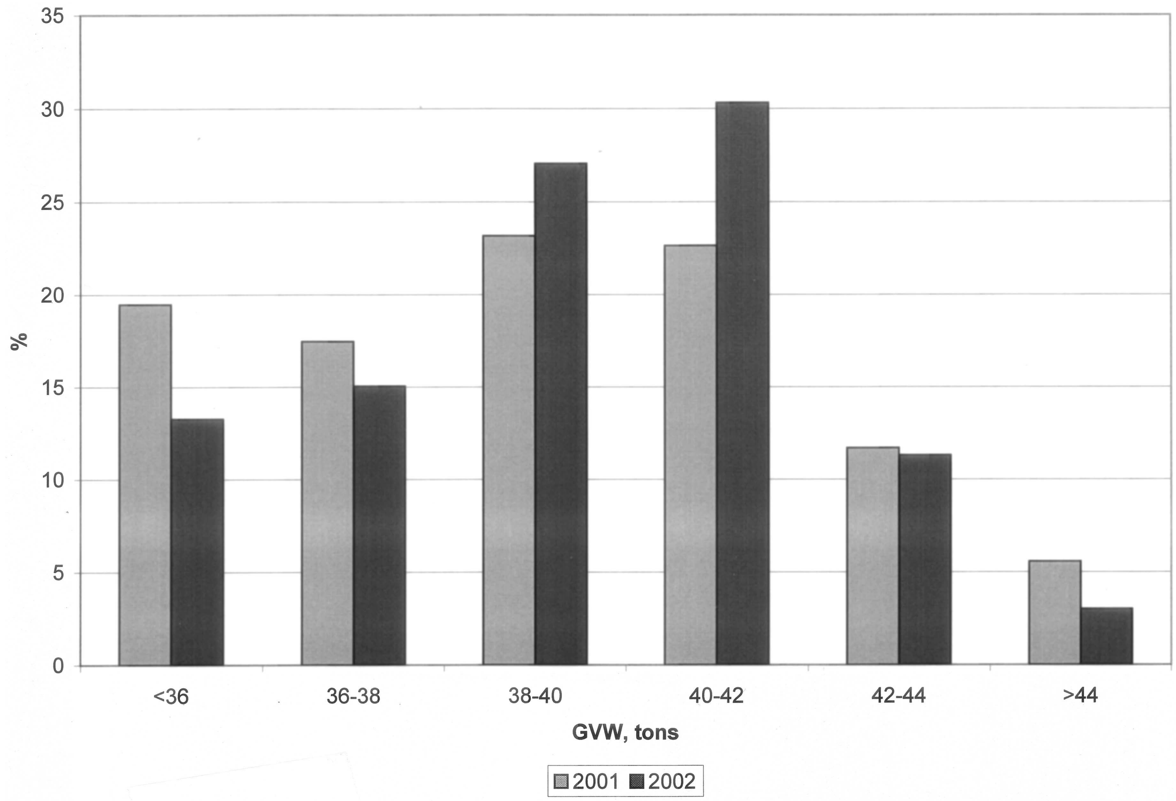

Figure 1. GVW distribution in Jan. 2001 and Jan. 2002.

maximum loads are hauled. Numerous trade magazine articles have addressed this issue during the past 10–15 years.

Ideally, the GVW distribution would be centered at the state-allowed limit (typically 80,000 pounds or 40 tons) with a narrow distribution to each side. While the distributions tend to be very symmetrical and nearly normal in appearance, they are often not centered at 80,000 pounds, nor do they have small levels of variability. As a result, payloads sometimes exceed the limit significantly. Many mills strongly discourage these grossly overweight loads due to concerns about legal liability and the public image of the industry. In this article, we examine the pattern of truck gross weights and payloads observed after a forest products company adopted a policy to discourage overweight loads.

Background

On Jan. 1, 2002, Rayonier implemented a new policy at its mills in Georgia to encourage compliance with state truck weight laws by providing a disincentive for suppliers to overload trucks. The policy was based on the belief that most suppliers wanted to comply with weight laws and on the reality that truck weights were typically estimated, not measured, in the woods. Under the new policy, a lower "overweight cull" rate is paid for weights exceeding 88,000 pounds (44 tons). Rayonier's financial disincentive thus only applied when the gross vehicle weight of a truck exceeded the legal limit by 10% or more. By law, several states (but not Georgia) currently allow a 10% GVW tolerance for trucks transporting timber and other products not typically weighed when loaded. The details of the new policy and its intent were communicated to Rayonier's suppliers on three separate occasions in the four months prior to implementation. However, Rayonier purposely did not suggest to contractors any methods, techniques, or equipment for complying with this change. They stated the desired end result and left the method and means of achieving it to their independent contractors. As a result, contractors were free to respond to the new policy in a variety of ways.

Methods

Before the new policy took effect, Rayonier asked the University of Georgia's Center for Forest Business (UGA) to study truck weight data before and after the policy's implementation to evaluate the degree to which the policy had impacted gross vehicle weights. To accomplish this, we collected from Rayonier truck weight information for all loads received at their Swainsboro and Offerman chip mills and their Baxley lumber mill during Jan. 2001 (before the change) and Jan. 2002 (after the change). All loads at each mill were studied, providing a 100% sample. Loads where tare (empty) weights of the truck were at least 10 tons were examined to focus solely on 18-wheel, tractor-trailer units. By design, this was a blind test where we simply observed the change in performance of the contractors. We did not communicate with the contractors during the initial month of the policy to determine how they were responding to the new policy to ensure that we did not bias or influence their

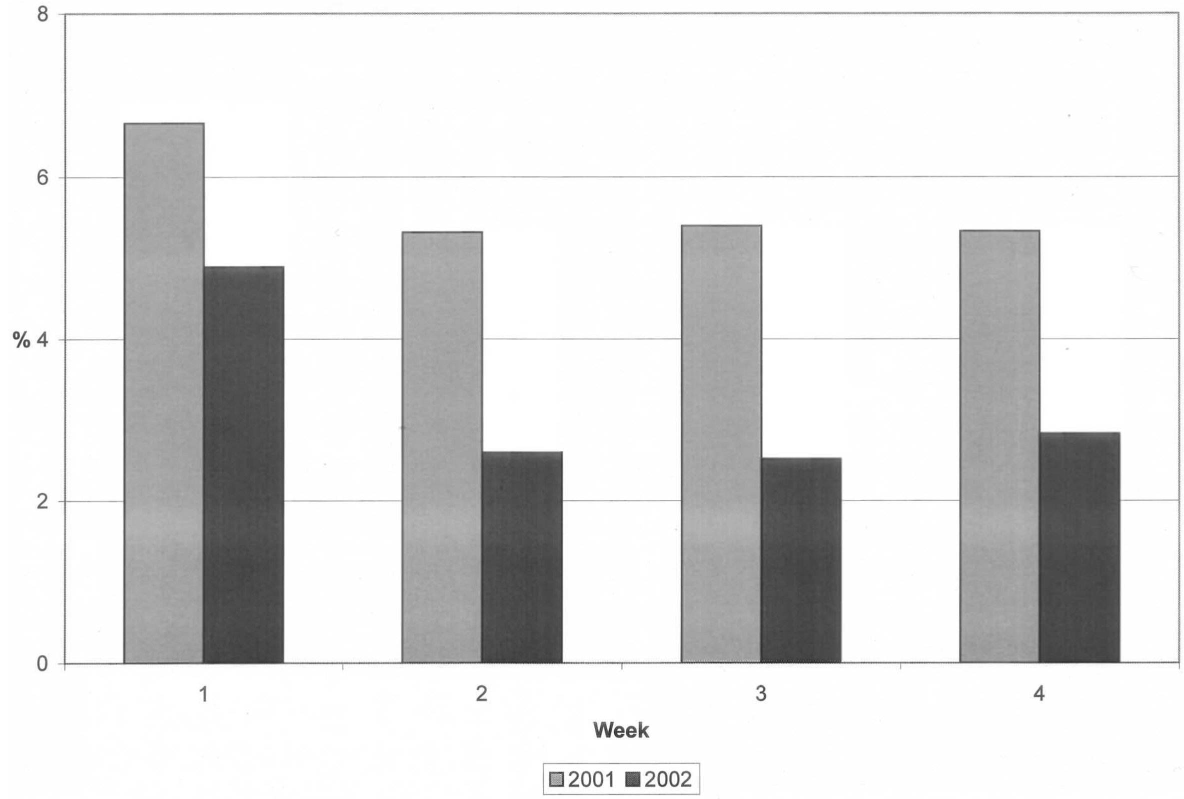

Figure 2. Loads exceeding 44 tons by week in Jan. 2001 and Jan. 2002.

responses to it. We did, however, communicate with logging association representatives to obtain their anecdotal observations of how contractors were responding. We also received feedback on the new policy in person while participating in continuing education programs for logging contractors in the months after the policy took effect.

Since Rayonier's objective was to discourage the gross overloading of trucks, the simplest and most effective way to evaluate the policy's effectiveness was to examine the percentage that exceeded the 44-ton threshold triggering the financial disincentive. We also examined the percentage that did not exceed the legal limit of 40 tons. Since log trucks typically are not weighed before leaving the woods, we also examined how many were within 5% (38–42 tons) or 10% (36–44 tons) of the legal limit. This is probably a fairer measure, given the general lack of in-woods weighing.

Data collected both before and after Rayonier's implementation of the truck overweight disincentive policy provided the opportunity to test if this policy altered the distribution of net payload weights. A common test for this hypothesis is the two-sample Kolmogorov-Smirnov (K-S) test (Conover 1999). This statistical procedure tests for possible differences in the distributions of two samples, as in the case with these data. The null hypothesis is that the two samples are from the same underlying distribution while the alternative hypothesis is that the samples are taken from different distributions. The two-sample K-S test is a nonparametric test that makes no assumptions about underlying distribution form.

Results

The dataset included 6,388 loads delivered to the three mills during Jan. 2001 and 7,687 truckloads delivered in

Table 1. Truck weight statistics at Offerman, Swainsboro, and Baxley during Jan. 2001 and Jan. 2002.

Statistics	Jan. 2001	Jan. 2002
Loads between 36 and 44 tons, %	75.0	83.7
Loads between 38 and 42 tons, %	45.8	57.4
Loads exceeding 44 tons, %	5.56	3.01
Average GVW (ton)	38.9	39.3
Average tare weight (ton)	14.4	14.5
Average payload (ton)	24.6	24.8
Standard deviation for GVW (ton)	3.64	2.94
Coefficient of variation for GVW (%)	9.35	7.48

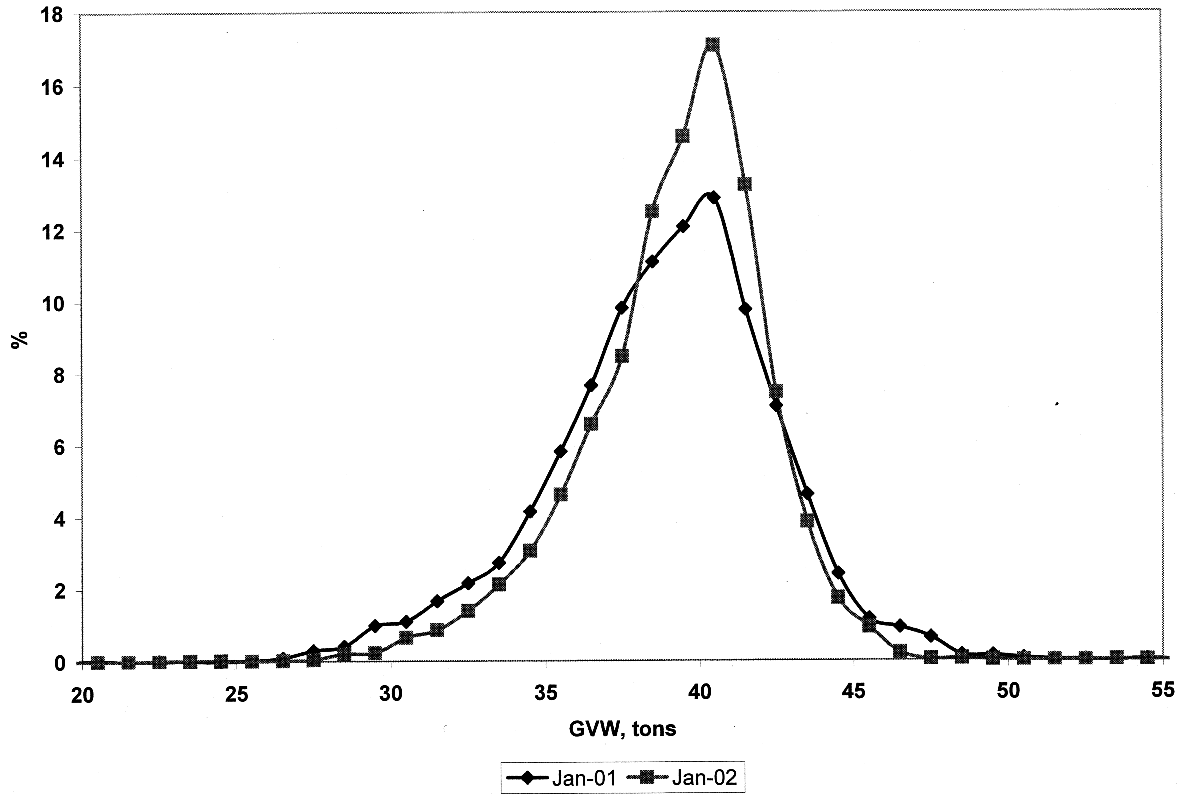

Figure 3. Distribution of truck GVW in Jan. 2001 and Jan. 2002.

Jan. 2002. After the new policy was implemented, the percentage of trucks arriving at Rayonier's mills within both 5 and 10% of the GVW limit increased (Figure 1, Table 1). In 2001, 75.0% of trucks were within 10% of the limit. This number increased to 83.7% in 2002. The largest category of improvement was with trucks within 5% of the legal GVW, which increased from 45.8% in 2001 to 57.4% in 2002. Given that most loggers do not use scales, this represents a dramatic increase.

Trucks with GVW exceeding 44 tons dropped from 5.56% in 2001 to 3.01% in 2002, a reduction of 46%. As noted in Figure 2, this improvement was obtained within 1 week of the policy's implementation. After the first week of Jan., fewer than 3% of the loads received exceeded 44 tons. This improvement has been maintained.

Given the complaints heard from the logging community when the policy was first implemented, Rayonier and UGA expected lower GVW and payloads across the board. However, we observed the opposite trend from the data. Average GVW increased from 38.9 tons to 39.3 tons, while average payloads increased from 24.6 to 24.8 tons (Table 1). These increases in average values were the result of less variability in the truck weights. The coefficient of variation of the GVW dropped from 9.35% in 2001 to 7.48% in 2002. The distribution of GVW during these two periods illustrated in Figure 3 clearly shows a dramatic reduction in the percentage of underloaded trucks (GVW $<$ 40 tons) between 2001 and 2002. The reduction is especially noticeable in the 30–36 ton GVW range. The population distribution for GVW in 2002 became more peaked with less variance than that exhibited in 2001. The two-sample K–S test confirmed that the two distributions were significantly different after the implementation of the new weight policy (K-S test statistic $= 0.13287$, $P = 0.001$).

We did not empirically evaluate the methods used by logging contractors to achieve this performance due to the blind design of the study. No doubt a variety of methods were used depending on the specific conditions of each logging contractor and their personal preferences. Based on discussions with logging contractors in the area, the purchase or more regular use of in-woods platform scales to monitor GVW was one of the most common responses to the policy. Some loggers already owned these devices but did not use them regularly. Others had been considering their purchase. The implementation of the new policy was often cited as the reason for purchasing the scales or for using them on a more regular basis. Other responses included closer attention to truck tare weights and more closely monitoring weights of previous loads. Since inattention to truck GVW could trigger a financial penalty, logging crews generally paid more attention to it and produced more consistent results regardless of the specific approach used. We had no reports of changes in the method or intensity of enforcing state weight laws by the state regulatory agency during the period of this study.

Conclusion

The new truck weight policy adopted by Rayonier appears to have largely achieved the primary objective of discouraging the loading of trucks beyond 110% of the legal limit. After the policy was implemented, the percentage of trucks loaded beyond 44 tons dropped from 5.56% to 3.01%, a reduction of nearly half (46%). This improvement was observed within a week of the new policy taking effect and has remained fairly consistent thereafter.

In addition, the increased attention by the logging community on truck GVW led to dramatic reduction in GVW variability measured several ways. The coefficient of variation of the GVW dropped nearly two percentage points, from 9.35 to 7.48%. The percentage of loads within 5% of the legal limit (38–42 tons) increased from 45.8 to 57.4%. This not only improved legal compliance, it also holds promise for reducing trucking costs due to lower payload variability.

Highway safety was potentially improved in two ways. First, the number of grossly overloaded trucks was reduced. In addition, by reducing the number of underloaded trucks, the same amount of wood could be delivered with fewer trucks on the highway. This also has potential public safety benefits. Furthermore, underloaded trucks increase per ton hauling costs and require additional investments by the logging community. This policy appears to have had positive consequences, intended and unintended, for both mill and logging contractor.

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