Fall TMR Mixer Maintenance

Matthew Digman, U.S. Dairy Forage Research Center

As fall field work nears completion, it is time to focus much-needed attention on livestock equipment. Preventing a TMR breakdown through regular maintenance is a much better situation than finding oneself with a half-loaded tub and an empty feed bunk in the middle of December.

Before getting started with the grease-work, it is always prudent to wear protective eye wear and gloves (e.g., Nitrile Rubber, Silver Shield, Viton) when handling chemicals such as grease, oil, fuel, and solvents. Greasing a mixer is more of a weekly routine than a once-a-year maintenance item. Regular maintenance of grease points on TMR mixers generally include: universal joints, drive-line bearings, and door guides and linkages. If the machine relies on grease lines, take some time to follow each one to its delivery point. Check both lines and fittings for leaks. There are also a few yearly grease points on these machines, such as the re-packing wheel bearings and load cell mounting tubes. Also, remember to check tire pressures. Proper tire inflation is critical to ensuring proper tire wear and life.

Next, on to chains. Make sure to clean any dirt or grease that may have accumulated. Dirt-laden grease can be abrasive, causing unnecessary wear to the drive components. While cleaning these areas, take a moment to check sprockets for excessive wear or for evidence that the chain has not been riding properly on the sprocket. These signs could indicate a misaligned sprocket, excessive chain elongation, or simply the need to adjust the chain tightener. Since mixing feed creates a dusty environment, some manufacturers opt for automatic oilers or partial submersion of the chain in an oil bath. For automatic oilers, make sure the reservoir is adequately filled. Additionally, it is important the oil dripper or brush is properly positioned over the chain. For oil baths, the oil level is also important. If the oil level is too high, it may indicate that the oil has been contaminated with water or feed ingredients. In this case, make sure the oil bath is properly sealed and shaft seals are in good repair. Finally, in addition to the roller chains, make sure apron chains are adjusted properly and tracking well. Adjustment usually entails taking up slack on either side of the conveyor until the conveyor's slats are restricted to a specified amount of movement from the conveyor floor. See the operator's manual for specific recommendations. Finally, after the lubrication work is done, take a moment to reinstall all safety shields. They do double duty - keeping operators safe and keeping dirt and feed off drivelines and chains.

The heart of many TMR mixers is the planetary gear-box. These compact, high-efficiency gearboxes are used in both vertical and horizontal mixer types. Be sure to check the oil level(s) and follow the manufacturer's recommendation for change intervals as well as draining and filling procedures. Most recommend a yearly oil change. After properly draining, check oil for moisture, dirt, or metal contamination. If the oil composition is off, take a sample to a dealer as they will have a better perspective based on their experience with similar model machines. Alternatively, send an oil sample in for analysis. A mail-in sample can be obtained at a local main-line dealership for between $10-$35, depending on the level of analyses. At the very least, utilize the viscosity, silicon (Si), and additive break down tests as these would indicate water, dirt, and the level of degradation in the oil, respectively.

Over time, feed ingredients take their toll on the mixer's augers, paddles, and hoppers. Inspect each of these elements for excessive wear. Wear can show up as thin or bent auger flighting, thinning or holes in hoppers, and the rounding of knives and clean out elements. The operator's manual will spell out tolerances that must be maintained for critical mixing components. For example, the manufacturer of the auger pictured above recommends that the auger scraper bar clearance to the side panel (tub) should not exceed ½". Most manufacturers offer replacements for all wear components. Some even offer wear-resistant, weld-on wear liners for hoppers and augers.

Figure 1. Planetary gear-box (left) oil reservoir (right).

Figure 2. Vertical mixer auger scraper bar and kicker.

The next area for inspection is the electrical system. For both the lighting (if equipped) and scale system, it is important to clear wires of buildup and debris and to make sure they are neatly tied up and out of the way. If wires run down a chase tube, make sure the tube is clear of debris. These tubes can become high-rise apartments for rodents. If you suspect a non-paying tenant, steel wool can be stuffed partially down the tube as a deterrent. Most TMR weigh bars or load cell wires are potted into the load cell (weigh bar), so damage to a wire means carefully splicing or, in some cases, sending the bar back to the manufacturer for repair. If cable splicing is needed, take care to use solder and heat shrink to ensure moisture is not introduced to the connection. Because the scale indicator predicts weight based on change in resistance in the load cell (weigh bar), changes in cable resistance can throw off the

calibration or cause erroneous readings. If suspicious of the system's accuracy, hang a weight or enlist someone to stand at each corner of the mixer. The weight should read the same at each of these locations.

Figure 3. Junction box (left) tail lights and reflector (right).

Next, remove the junction box cover and check for corrosion. The box should be sealed and water tight. Also, check that all wires are tight in the connector block. The weigh bars themselves need little maintenance - just a yearly shot of grease in the receiver tube discussed earlier. Load cells, on the other hand, usually employ a check arm system to keep the mixer secure to the trailer/truck without transferring any weight to the frame. The spherical joints of these arms should be tightly attached to the mixer and trailer/truck frame, yet the arms should be free to move about the spherical joint. Work with some oil or grease and a rubber mallet to free the joint. Do not loosen the attachment points as the mixer could become unstable, shearing the bolts and causing significant damage. Replace any check arms that cannot be freed.

Lastly, check the lighting, reflectors, and slow moving vehicle (SMV) emblem if planning road travel. Most states require slow moving vehicles (<25 mph) be equipped with both SMV emblems and rear reflectors visible for at least 500 ft to the rear. Dirty or faded signs and reflectors provide little or no protection in traffic.

Operators should strongly consider employing these useful maintenance tips as winter approaches. Doing so will reduce the chances of breakdowns when temperatures turn frigid.