Farming machinery (1) Operation of ride-on tractors

Tractors refer to a special type of vehicles that have an independent motor, can move without relying on rails, and can tow objects. The uses and types are wide-ranging and the vehicles that tow a trailer and run on roads are also a type of tractor. There are many differences between farm tractors and general vehicles, since the former have been improved for agricultural purposes although their basic structure and operation are the same as those of general vehicles.

In this practice, you will learn the basic structure and operating skills of farm tractors.

1. Pre-operation inspections
   1) Parts that need inspections
      To prevent accidents caused by hitches and operate tractors safely and efficiently, you need to inspect the engine, transmission, driving gear, control gear, and other parts (everyday inspections).
   2) Inspection items
      You must inspect oil and fuel levels and look for leaks, as well as coolant leakage and level, loss or loosening of connectors such as nuts and bolts, and the general operation conditions of the clutch and brake, among others.
   3) Make sure you know how to stop the engine.

2. Getting on a tractor and operation posture
   1) Get on the tractor from the left-hand side of the vehicle without putting your hands (without putting your weight) on the operation parts (e.g., steering wheel).
   2) Sit in a position that allows you to press the clutch and brake pedals fully.
   3) Do not grab the steering wheel with your thumbs placed under it; instead place your hands on the steering wheel.

3. Starting the engine
   1) Check that the parking brake is engaged.
   2) Press the clutch pedal fully. Unlike general vehicles, some tractors use a single pedal to cut power transmission from power take-off (PTO) and to wheels. In this case, the upper portion of the clutch pedal movement range is used to cut power transmission to the wheels and the lower portion is used to cut power transmission from the PTO. You should also take note that the movement range of the clutch pedal is longer for this clutch type.
3) Confirm that the two brake pedals located on the right-hand side of the vehicle are connected by a ratchet so that they function as one.

4) Put gear-change levers (there may be a few levers depending on the tractor type) and hydraulic levers in the lowered position and the PTO lever in the neutral position.

5) Farm tractors have two throttle levers: hand-throttle and foot accelerator. You can start the engine by pulling the throttle to your side to the acceleration position and turning the engine key. Release the key as soon as you hear a burning noise, which will automatically return the key to the operation position. There are models equipped with safety functions such as the one wherein until you put the acceleration lever and the PTO lever in their neutral positions and press the clutch pedal fully, the starter motor does not get electrified and the engine does not start. On cold days, preheat the engine before starting it.

6) Put all the gear-change levers in the appropriate positions for the operation and work speeds you are about to undertake. Press the clutch pedal fully while operating the gear-change levers.

4. Starting

1) Pull the throttle lever a little to increase the engine speed.

2) Release the parking brake and then release the brake pedals.

3) Signal your departure, check for safety in all directions and then gradually release the clutch pedal. This will start the tractor. Becoming impatient and releasing the clutch pedal too quickly may result in a sudden, dangerous start; release the pedal slowly until it is fully released.

5. Operation and change of travel direction

1) The operator should look far ahead when traveling straight while the adjusting travel direction so that the destination, the nose of the tractor, and yourself make a straight line. When turning, avoid sudden movements of the steering wheel and move the wheel gradually.

2) Speed control should be made using the throttle level without using the gear-change lever. Changing gears during operation can damage the transmission. When operating the gear-change lever, you must stop the tractor and change the position of the gear-change lever. Use the foot acceleration pedal on roads and use the hand throttle lever on fields.

3) The steering wheels of farm tractors have no play, so operators must be very careful in handling the steering wheel. Holding the steering wheel from the inside of its rim when driving in fields is dangerous.

4) When turning right or left on roads, you must indicate 30 m before the turn. When changing the driving lane, you must indicate three seconds before you make the action.

5) When making a turn, the operator must check for safety in all directions. If the tractor has an implement attached, care must be taken as the width and length of the implement

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have been added to those of the tractor. (Side collisions are more likely to occur when changing lanes or making a turn.)

6) Slow down sufficiently before turning the steering wheel in one big movement. Farm tractors, due to their higher center of gravity than general vehicles, are prone flipping during a high-speed turn due to centrifugal force.

7) When entering or exiting a field, the operator must do so at a right angle with the brake pedal ratchet hooked so both left- and right-hand side brakes work simultaneously. In fields, the operator must detach the ratchet so the brakes work independently on the left- or right-side wheel (independent braking).

8) When making a sharp turn in fields (e.g., in headlands), the operator must lower engine speed and use independent braking. The operator can turn in a small circle by turning the steering wheel and pressing the turning side braking pedal. Release the brake pedal immediately before the tractor faces the target direction. When exiting fields, the operator must hook the ratchet on the two brake pedals to cancel independent braking.

9) When slowing down, do not use the brakes, use the throttle lever, instead. Since farm tractors have a high driving force, their speed cannot be controlled by braking.

10) When ascending or descending slopes, put the gear-change lever in a safe position before ascending or descending. You cannot change gear on a slope and it is very dangerous if the gear is not in the proper position. Use the engine brake effectively while descending.

11) When driving backwards, turn your upper body 90 degrees to the side so you can have a better rear view and check for safety constantly. Be careful that you avoid unconsciously turning the steering wheel when you turn your upper body to the side.

6. Stopping

1) Push the throttle lever forward to slow the engine speed.

2) Check for rear safety, press the clutch pedal fully, and then slowly press the brake pedal. Do not press the brake pedal quickly, as it stops the vehicle suddenly and is dangerous for the operator and vehicles that may be following.

*Note: The order of pressing the clutch and brake pedals is opposite to that for general vehicles. When using the independent braking mode, press both pedals simultaneously.

3) Put all gear-change levers in the neutral position and then slowly release the clutch pedal.

4) Engage the parking brake and release the brake pedals. When parking on a slope, apply car stops (drags) to the underside of the driving wheels.

5) Stop the engine and then get off the tractor. You need to know the engine shutdown method in advance, as the method varies by tractor type; you may just need to turn the engine key or you may need to pull the fuel stopper.
7. Getting off

1) Check for safety in the rear direction.
2) Check the ground condition and dismount the tractor from the left-hand side. Operators must get on and off from the left-hand side of the vehicle. This is because many tractors have levers and pedals on the right-hand side, which makes it difficult for the operator to get on and off from that side. For some tractor types, operators cannot get on and off from the right-hand side.

8. Precautions for operating farm tractors

1) In operating the throttle lever, for many tractor types, engine speed decreases by pulling the lever forward and increases by pulling the lever toward the operator.
2) Farm tractors have a high driving force and can start in all gear positions. Do not change levers while the tractor is in motion. Make sure to stop the tractor and then change levers and then start the tractor.
3) During operation in fields, hold the steering wheel tight, as bumpy ground and differences in soil hardness easily change travel direction.

9. Safety considerations

1) Pay attention to abnormalities such as engine sounds, other sounds, vibrations, smoke, and abnormal smells.
2) Learn the functions of the control system well and do not operate incorrectly.
3) Be sure to carry out everyday inspections, pre-operation inspections, and post-operation inspections to prevent mechanical troubles.
4) In principle, carry out inspections after the engine has been stopped.
5) When the tractor tilts to the side violently, such as when driving over ridges and farm roads, and when loading materials onto the tractor, the operator must drive the tractor very slowly and carefully. If the front wheels have lifted from the ground, immediately press the clutch pedal. When an implement is attached to the tractor, keep the implement at a low position. Drive backwards if necessary.
6) Maintain driving speed that does not put excess load on the engine, the transmission, and other parts.
7) When driving a tractor with a PTO-driven implement attached to it, make sure to put the PTO lever in the neutral position (particularly when a rotary is attached to the tractor).
8) During operation in a field, if you lift an implement without lowering the engine speed, the tractor will suddenly increases speed. Before lifting an implement, lower the engine speed to the extent that it does not stall the engine.
9) During operation using a rotary, the tractor may suddenly increase speed on hard surfaces.
10) Do not allow other people to ride on the implements.
11) During operation, avoid sudden braking while the clutch is disengaged.

10. Farm tractors and legislation

1) Application of the Road Traffic Act
(1) The Road Traffic Act applies to farm tractors when they are used on general roads.
(2) Farm tractors cannot go fast so stop at the stop line on a yellow signal where possible.

2) Classification of tractors under the Road Transport Vehicle Act
(1) In January 1997, the classification of small special vehicles (which does not require regular mandatory automobile inspections) changed, eliminating length, width and height, and total displacement limits from farming tractors, leaving the only condition: the maximum speed must be lower than 35 km/h. However, vehicles whose maximum speeds are 35 km/h or over are now classified as large special vehicles (which require regular mandatory inspections) regardless of total displacement and other sizes. With the current small special vehicle license, you can drive ride-on tractors with the maximum speed of 15 km/h or less, a total engine displacement of 1,500 cc or less, a vehicle length of 4.7 m or less, a vehicle width of 1.7 m or less, and a vehicle height of 2.7 m or less. To drive a tractor that does not satisfy all of these standards, you need a large special vehicle license (a restricted license for farming use is available).
(2) Large special vehicles: Ride-on tractors whose maximum speed is 35 km/h or over.

3) Driving licenses
(1) Driver’s licenses are issued under the Road Transport Vehicle Act and are not required for driving vehicles outside roads. However, even just crossing a road constitutes driving on the road.
(2) To drive large special vehicles on roads, you need a large special vehicle license. If you just need to drive farming tractors, you only need a restricted large special vehicle license for the operation of farming vehicles.
(3) To drive a ride-on tractor or a hand tractor on roads (both classified as small special vehicles) towing a tractor, you need an ordinary motorcycle license or a small special vehicle license.
4) Legal matters under the Road Transport Vehicle Act

(1) To drive a large special vehicle on roads, you need to attach a license plate to the vehicle.

(2) To drive a small special vehicle on roads towing a trailer, you must attach a license plate to the back of the trailer. (The plate is not required if not towing a trailer.)

(3) Tractors that are not driven on roads do not require license plates.

References

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