Demonstration mobile laboratory built for on-site testing of manure nutrient content

P.D. Martin[1] and D.F. Malley[2]

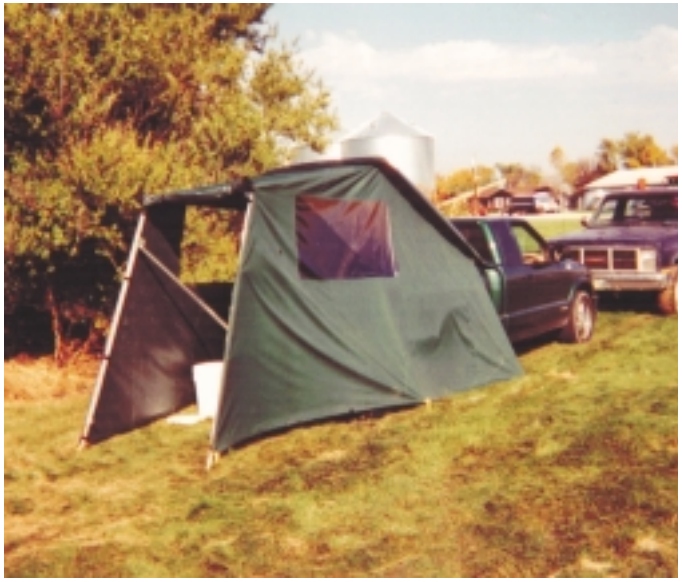
[1]PDK Projects, Inc. #2 - 12 McGillivray Place, Winnipeg, MB R3T 1N4; Tel: 204-452-7842; Fax: 204-452-7883; Email: pdmartin@pdkprojects.com
[2]PDK Projects, Inc., 365 Wildwood Park, Winnipeg MB R3T 0E7; Tel: 204-284-8047; Fax: 204-475-6090; Email: dmalley@pdkprojects.com; Web site: www.pdkprojects.com

ABSTRACT

Under the auspices of the Western Canadian Hog Manure Management Strategic Initiative, a mobile laboratory was designed and built to bring rapid analysis instrumentation to the farm. Requirements necessary to do so included provisions for remote power, protection from inclement weather, stability in transit, user friendly access, and security when not in use. The mobile laboratory was designed and manufactured in-house by PDK Projects, Inc. and was constructed to fit the bed of a compact pickup. The resulting design consists of an instrumentation and power deck, tonneau cover, and tent assembly. The instrument deck is easily installed or removed, and requires no drilling or other modifications to the pickup truck bed. The deck provides an easily accessible work surface and is very stable under severe driving conditions. The tonneau cover provides lockable, out-of-view security, as well as protection from wind and rain in transit or when parked. The tent assembly provides all weather protection to both the equipment and the operator during laboratory function.

The laboratory contained two near-infrared spectrophotometers; a prototype Textron/Case NH ProSpectra® and a Zeiss Corona®, and their associated laptop computers. The instruments were successfully operated on-board for the scanning of hog manure samples from 13 Manitoba hog operations. Work is underway to prepare calibrations between the spectral data from the manure samples and their chemical composition determined by conventional laboratory analysis. The calibrations would make it possible to operate the instruments on site for the instantaneous analysis of N and P in grab samples of hog manure.

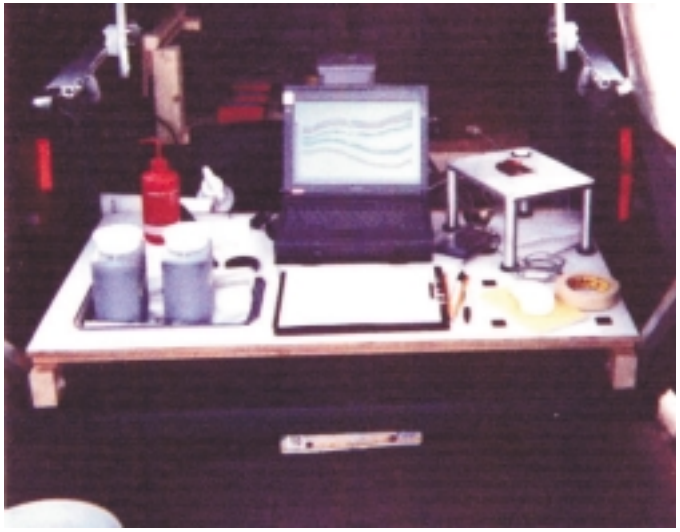
When fully operational and tested, this mobile analytical capability may be useful for rapid on-site analysis of the composition of manure stores. This would in turn be useful for providing timely information for planning manure applications.



Description of Laboratory Components

Pickup

The mobile lab was built to fit a 1999 Chevrolet S-10 Extended Cab Shortbox chassis. However the design is easily transferable to other makes and models of pickup trucks. An air assist suspension was installed at the rear axle to allow for ride attitude adjustment under load. A spray-in boxliner was applied to protect the truck bed from possible corrosion, etc.



Power and instrumentation deck

Power is supplied to the instruments via a 600 amp/hour battery bank consisting of 6, 100 Amp hour gel-cell batteries. The power distribution system includes a charging system, a power regulation system, and provision for an alternate power supply. The batteries and instruments are mounted on a wooden deck. The deck consists of a plywood surface above a ladder frame. Integral to the frame is a uniquely designed tension assembly, which fastens the deck to the truck bed.

No drilling or other modification of the truck bed is necessaary for installation. Also integral to the deck is a self supporting sliding lab bench. The bench pulls out and locks in place over the tailgate of the truck and can be levelled manually.

Tonneau cover

An aftermarket custom fit fibreglass tonneau cover provides protection and security while in transit or when the vehicle is parked. The cover can be locked manually. When locked, the cover will not allow the tailgate to be opened.

Tent assembly

A custom designed Tonnotent™ provides protection from the elements to both the operator and the equipment. The tent attaches to the underside of the tonneau cover, and extends out and over the sides of the vehicle to the ground. The tent also extends over the back tailgate, where it is a supported by an aluminum A-frame. Two arms of the A-frame assembly attach directly to the tailgate of the truck, while the other two rest on the ground. The latter also act as a door frame to the resulting enclosure.

ACKNOWLEDGMENTS

The design and manufacture of the mobile lab was funded through the Western Canadian Hog Manure Management Strategic Initiative of CETAC-West through funding from Western Economic Diversification and the Canadian Climate Change Action Fund (Technology Early Action Measures - TEAM).