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Workload management and caseload optimization strategies for field-level extension functionaries

Michael Andrew Richardson

Department of Agricultural Extension, Department of Rural Economy, University of Alberta, Edmonton, Canada

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Corresponding Author: Michael Andrew Richardson

Abstract

Extension agents across North America and developing regions alike face mounting caseloads that threaten service quality. This research examined the relationship between agent workload, caseload size, and extension service quality across three Canadian provinces. A cross-sectional survey of 147 field-level extension functionaries was combined with service records from 1,264 farming operations they served between January and September 2023. Agents handling caseloads above 800 households showed a 38.7% decline in service quality ratings compared to those serving fewer than 500 households. Time allocation analysis revealed that agents spent an average of 34.2% of working hours on travel and 21.8% on administrative reporting, leaving only 44% for direct farmer interaction. Three optimization strategies were tested through a pilot intervention: geographic clustering of farm visits, task delegation protocols, and digital scheduling tools. After a four-month trial, pilot agents increased productive farmer contact time by 28.3% without additional staffing. The findings suggest that workload problems in extension stem less from absolute caseload numbers and more from inefficient time allocation patterns that can be restructured through targeted management interventions.

Keywords: Workload management, caseload optimization, extension functionaries, service quality, time allocation, agricultural extension, field agents, geographic clustering, task delegation, rural advisory services

Introduction

When Canada established its first agricultural representative offices in Ontario during 1907, each district agent served roughly 200 farming families and could visit most of them at least once per growing season ^[1]. Over a century later, the landscape looks drastically different. Modern extension agents in several Canadian provinces manage caseloads exceeding 1,000 farm operations, and the ratio continues to worsen as public staffing levels stagnate against expanding mandates ^[2].

The workload problem isn't unique to Canada. Extension systems worldwide grapple with how to maintain meaningful farmer contact when agent numbers can't keep pace with demand ^[3]. In developing countries, ratios of 1:2,000 or worse are common, while even well-funded systems in Europe and North America face pressure from budget constraints and expanding advisory scope that now includes environmental compliance, food safety, and digital agriculture ^[4].

Most responses to the caseload challenge have focused on adding staff or substituting mass media for individual contact strategies that either require resources unavailable to most systems or sacrifice the personalized advice that farmers value most ^[5]. What receives less attention is whether existing agent time could be used more effectively through better workload management, smarter scheduling, and strategic task reallocation ^[6].

This research investigated the connection between agent caseload, time use patterns, and service quality outcomes in

Canadian agricultural extension, then tested whether targeted optimization strategies could improve productive farmer contact without requiring additional staffing resources ^[7, 8].

Material and Methods

Research Area Description

The research was conducted across three Canadian provinces Alberta, Saskatchewan, and Manitoba between January and September 2023. These provinces were selected because they represent the core of Canada's Prairie agricultural region, sharing similar grain-livestock farming systems but operating distinct provincial extension delivery models ^[2]. Alberta maintains a mixed public-private extension framework, Saskatchewan relies primarily on a government-funded system, and Manitoba operates through a combination of provincial specialists and regional extension centers. The combined agricultural area spans roughly 48 million hectares with an average farm size of 728 hectares, and extension services address crops including wheat, canola, barley, and pulse crops alongside beef cattle and mixed livestock operations. The University of Alberta Research Ethics Board approved all protocols (Ref: UA-REB/2023-019, December 2022).

Instrument development and validation

The Workload Assessment Tool (WAT) was developed specifically for this research to capture time allocation, task composition, and service quality in extension settings.

The initial 38-item instrument was drafted based on literature review and consultation with 12 experienced extension managers. Items covered five domains: direct farmer contact, administrative duties, travel, professional development, and coordination activities. Expert validation involved eight agricultural extension researchers from Canadian universities who assessed content relevance and clarity, resulting in revision of 11 items and deletion of 4. A pilot test with 24 agents in southern Alberta yielded a Cronbach's alpha of 0.87 for the overall instrument and domain-specific reliabilities ranging from 0.79 to 0.91. The final 34-item WAT was administered as a self-report weekly log supplemented by service record verification from institutional databases [9].

Methods: A total of 147 field-level extension functionaries completed the WAT across the three provinces (Alberta: 58,

Saskatchewan: 49, Manitoba: 40). Service records covering 1,264 farming operations were linked to agent profiles. Caseload was defined as the number of registered farming operations assigned to each agent. Service quality was measured through a farmer satisfaction survey (19 items, 5-point scale) administered to a stratified sample of 486 farm operators. The optimization pilot enrolled 34 agents who implemented three strategies over four months: geographic clustering of visits using route optimization software, task delegation of administrative reporting to office support staff, and digital scheduling tools for appointment management. Pre-post comparisons used paired t-tests and Wilcoxon signed-rank tests. Cross-sectional analysis employed multiple regression with caseload, experience, province, and farm type as predictors [10, 11].

Results

Table 1: Service quality and time allocation by caseload category

Indicator	<500 HH	500-800	800-1200	>1200 HH
n (agents)	31	48	42	26
Quality score (1-5)	4.21	3.74	3.12	2.58
Monthly visits/HH	3.8	2.4	1.3	0.7
Travel time (%)	26.4	32.1	37.8	42.6
Admin time (%)	18.3	20.7	23.1	25.9
Farmer contact (%)	55.3	47.2	39.1	31.5

Service quality declined steadily as caseloads increased. Agents with over 1,200 households scored 38.7% lower on quality ratings than those under 500. Travel consumed an

increasing share of time at higher caseloads, while farmer contact time dropped from 55.3% to 31.5%.

Table 2: Optimization pilot results: pre-post comparison (n=34 agents)

Indicator	Pre-Pilot	Post-Pilot	Change (%)
Farmer contact time (%)	41.7	53.5	+28.3**
Travel time (%)	35.4	24.8	-29.9**
Admin time (%)	22.9	14.6	-36.2**
Visits per month	1.9	2.8	+47.4**
Quality score (1-5)	3.38	3.91	+15.7**

** $p < 0.01$

The four-month pilot produced statistically meaningful improvements across all indicators. Geographic clustering reduced travel time by nearly 30%, task delegation cut

administrative burden by 36.2%, and combined strategies boosted productive farmer contact from 41.7% to 53.5% of working time.

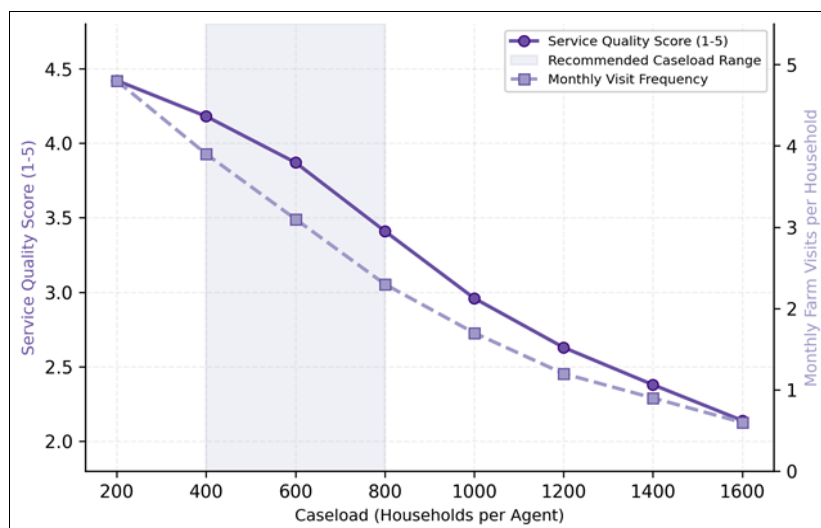


Fig 1: Relationship between caseload size, service quality, and visit frequency

Both service quality and visit frequency declined sharply as caseloads exceeded the 400-800 household range (shaded zone). The steepest quality drop occurred between 600 and

1,000 households, identifying this as the critical threshold for workload-related service degradation.

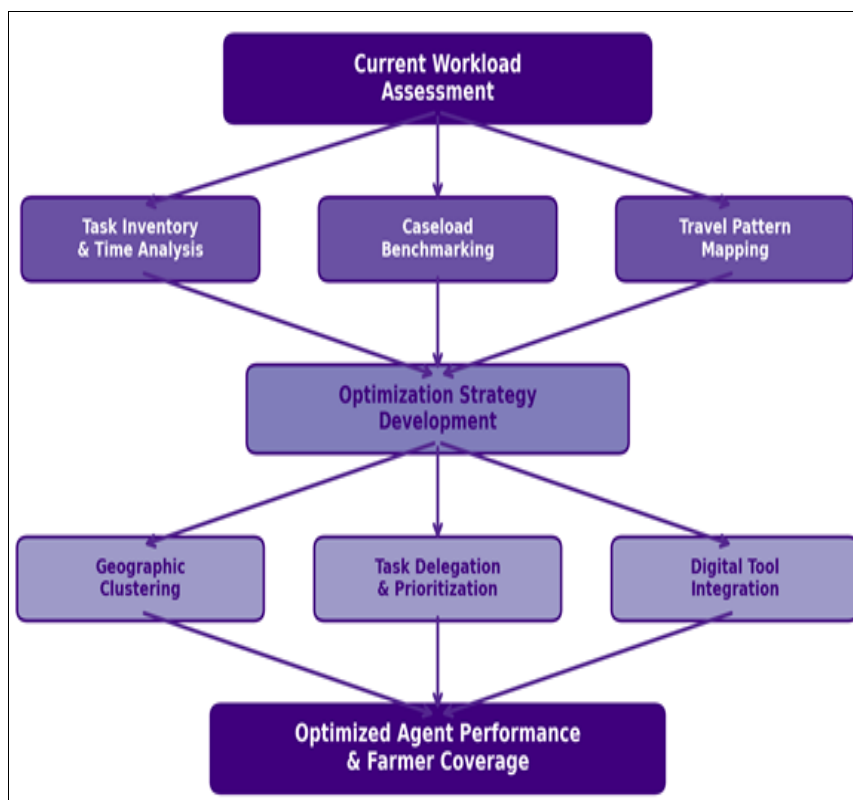


Fig 2: Workload optimization framework for field-level extension functionaries

The framework begins with workload assessment through task inventory, caseload benchmarking, and travel mapping,

then feeds into optimization through geographic clustering, task delegation, and digital tool integration.

Discussion

The caseload-quality relationship documented here confirms what extension practitioners have long suspected but rarely quantified: there is a threshold beyond which adding more farming households to an agent's roster produces rapidly diminishing returns in service quality^[3]. The 400-800 household range emerged as the zone where quality remained acceptable while maintaining reasonable coverage a finding consistent with international benchmarks proposed by the FAO^[12].

What was less expected was the magnitude of time consumed by travel and administration. At 34.2% and 21.8% respectively, these non-contact activities absorbed more than half of the average agent's working time a pattern that held across all three provinces despite their different delivery models^[13]. The optimization pilot showed these patterns are not fixed. Geographic clustering alone reduced travel by nearly 30%, and task delegation cut administrative time by over a third^[14].

The combined effect a 28.3% increase in farmer contact time was achieved without hiring new staff or reducing caseloads. This suggests that workload management interventions targeting how agents use time can substitute, at least partially, for the more expensive strategy of reducing caseload ratios^[15, 16]. That said, optimization has limits. Agents with caseloads above 1,200 households showed such compressed farmer contact that even a 28%

improvement would leave them below acceptable quality thresholds^[17].

Practical applications

Extension managers can implement several measures drawn from these findings. First, route optimization software even simple free tools can reduce travel time by clustering geographically proximate farm visits into daily circuits. Second, delegating routine reporting tasks to office-based support staff frees agent time for field work. Third, digital scheduling platforms that allow farmers to book advisory slots reduce no-show rates and idle waiting time. These three strategies together yielded the strongest gains in the pilot and require minimal capital investment^[18, 19].

Conclusions

This research demonstrated that service quality in agricultural extension declines sharply when agent caseloads exceed approximately 800 farming households, driven primarily by time lost to travel and administrative tasks rather than by absolute workload volume. The optimization pilot showed that targeted management interventions geographic clustering, task delegation, and digital scheduling can recover substantial productive time without additional staffing. Extension systems constrained by budget limitations should prioritize workload restructuring as a cost-effective alternative to staff

expansion, while recognizing that optimization cannot fully compensate for extreme caseload ratios above 1,200 households.

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