



# AATSAF - CGIAR++ Junior Scientists Program Final Report

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**Title: Sustainable intensification of cattle husbandry systems in the Colombian Amazon (Caquetá) -A cost-benefit analysis**

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## 1. Introduction

Through a successful application for the Junior Scientist Program of the Council for Tropical and Subtropical Agricultural Research (ATSAF e.V.) I fulfilled the position as a Visiting Researcher at The Alliance Bioversity International - CIAT in Palmira. This opportunity allowed me to (i) carry out research for my master's thesis and (ii) experience first-hand insights from my work as a researcher in an international research center. The present final report summarizes (i) personal and (ii) academic endeavors from that time.

Shortly after my arrival on the 6th of April 2023 in Santiago de Cali, I could go to the campus of The Alliance Bioversity International - CIAT for the first time. A sound preparation, by a nearby bus stop, which directly transferred me daily to my workplace and a prepared office, allowed me to start my work optimally. As one of the main buildings in Fig. 1, the campus features multiple scientific work fields, which allows valuable conversations with international experts.



*Figure 1:* Research institute of Alliance Bioversity International - CIAT in Palmira. Source: Own photo

First meetings with my supervisors helped me to organize my future work plans and introduce myself to the working group, the Tropical Forages Program. After further reviewing relevant literature on my future study field, a first explorational stay in the study area, Caquetá, was set up. Together with the supervising Ph.D. student, multiple farm visits were carried out. I highly value this first stay since it allowed me to adapt to the study area and its climatic and sociologic conditions and experience methodological interview approaches. In addition, I was able to build up contacts with stakeholders, extensionists, and researchers during that time in cattle husbandry.

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Not only are these contacts academically valuable to understanding background research and further enlarging my network as a scientist, but they were also personally highly appreciated. During this and the second stay in Caquetá, I could more comprehensively understand the study area and its (i) diverse agrarian structure, (ii) stunning landscape and (iii) heartwarming people. One of the photographs I was able to capture during this stay is shown in Fig. 2



**Figure 2:** Landscape of Caquetá. Own photo.

My study endeavors progressed since, under the support of my supervisors and local experts, I could identify the fifteen farmers for my interviews. Subsequently, farmer- and expert interview guidelines were designed, and pilot interviews were carried out. Through these test interviews with work colleagues from the team, it was possible to adapt the interviews further to the local language and conditions. Furthermore, the methodological approach for the subsequent economic analysis, a cost-benefit analysis, was constructed under the guidance of (i) regular supervisor meetings and (ii) daily conversations in the research center. I was included in regular activities, such as team meetings, which gave me insights into the activities of a researcher in the field.

Two expert interviews were carried out during June, which allowed me to further understand the frameworks of the study department before conducting the interviews in July. The interviews themselves allowed me to (i) strengthen my skillset in qualitative research, (ii) deepen intercultural competence, and (iii) enhance adaptiveness to unforeseen situations. I experienced flaws in my approaches and ways to correct them during the research process.

## 2. Results

Through the interviews, three farm types were characterized, and alternative feed production methods were described. This resulted in Tab. 1, depicting key characteristics of the farm types.

**Table 1:** Depiction of the typical farm characteristics for the three farm types (farm type 1: dual-purpose with emphasis on milk production and high technological, farm type 2: dual-purpose with emphasis on milk production and low technological level; farm type 3: dual-purpose where milk is transformed into cheese). Authors' creation.

Categories	Unit	Farm type 1	Farm type 2	Farm type 3
Educational level	Text	Second Level and Higher	First Level	First Level and Second Level
Minutes to the nearest town	Minutes	36	112	108
Type cattle husbandry	Text	Dual-purpose and specialized dairy	Dual-purpose	Dairy and dual-purpose
Hectares total finca	Hectare	110	83	35
Hectares pasture	Hectare	90	44	25
Labor:				
- Full-time	Number	4	2	1
- Part-time	Number	2	3	2
Size cattle herd	Number	115	49	35
Breed	Text	<i>Guir</i> <i>Guirolando</i>	<i>Guir</i> <i>Siete Colores</i>	<i>Cebu</i> <i>Siete Colores</i>
Use of reproduction technologies?	Text	Yes	No	No
Milking machine?	Text	Yes	No	No
Average milk yield	l/cow/a	1,980	866	1,184
Average lactation period	Days	251	246	258
Transforming milk?	Text	No	No	Cheese
Average live-weight gain	kg/AU/a	127	165	167

Furthermore, the following four production methods could be described:

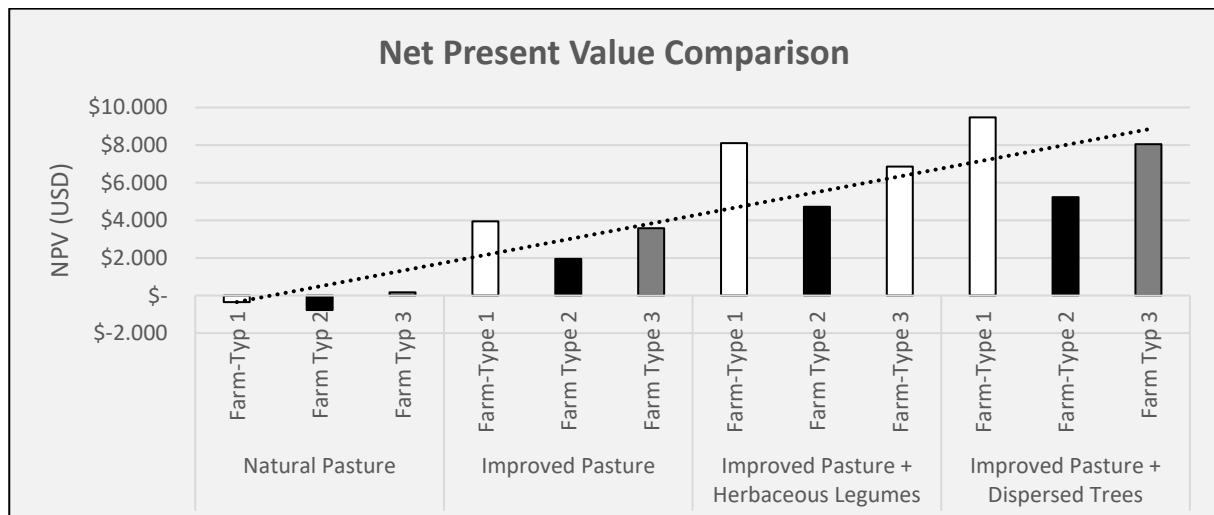
**Natural/Naturalized Pasture (NP):** Production method involving cattle-husbandry on areas with native pasture grasses or low-productive introduced pasture grasses. (Grama dulce / Grama nativa). It encompasses the lowest cost and productivity levels.

**Improved Pasture (IP):** Introduction of potentially high-yielding grass varieties, e.g., *Brachiaria brizantha*, characterizes this production method, leading to higher carrying capacity and higher productivity levels.

**Improved Pasture + Herbaceous Legumes (IPL):** Based on Improved Pasture with the introduction of herbaceous legumes (e.g., *Arachis Pintoi*) to increase (i) nutritional content and (ii) soil fertility through nitrogen fixation.

**Improved Pasture + Dispersed Trees (IPD):** Based on Improved Pasture, integrates trees to provide benefits, such as enhancing animal welfare and productivity through shadow provision.

These were evaluated in the scope of the present report. The Net Present Value is shown as a proxy for this comprehensive chapter:



**Figure 3:** Comparison of Net Present Value distinguished by (i) production method and (ii) farm type. Authors' creation.

### 3. Conclusion

Various advantages of the sustainable intensification of feed production methods were identified. IPD provides the highest profitability indicators but also provides environmental benefits, such as carbon sequestration. Nevertheless, their suitability for the three farm types differs, as it is the most labor-intensive method. In this regard, farms are having substantial difficulties enlarging their workforce, as farm type 2 and farm type 3 may adopt the Improved Pasture + Herbaceous Legumes instead. This production method has decreased work time and skill requirements.

Further expert interviews permitted precise data interpretation and valuable information for the problem derivation in the thesis. Identified research gaps in areas such as seed provision for local species permit attractive future research opportunities.

In conclusion, I thank ATSAF e.V. for (i) initially giving me the chance and (ii) supporting me during my research stay. Furthermore, I want to express my sincere gratitude to my supervisors, Prof. Lippert (University of Hohenheim), Dr. Burkart (Alliance Bioversity International - CIAT), and M.Sc. Anja Lienert (University of Hohenheim and Alliance Bioversity International - CIAT), for their guidance. This experience gave me a fruitful basis for my future career, which I would appreciate to continue in this research area.