Application of Appropriate Technology for the Development of Feed Sources of Fe and Zinc as Mitigation of Reducing Stunting Prevalence in Kulon Progo

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ABSTRACT

Stunting is one of the priority health and nutrition problems in Indonesia. In the 2020-2024 National Medium Term Development Plan (RPJMN), the government targets the stunting rate to be 14%. The stunting rate in Indonesia using UN standards is still above 20 percent (BKKBN sources say 24.4 %). The handling of stunting cannot only target the stunting toddler group. Involving one life cycle from young women, pregnant women, and toddlers becomes a critical window in specific interventions to prevent and treat stunting. Therefore, awareness for fulfilling nutrition is an awareness that needs to be grown on a family basis. In farming families, it can be started by developing food sources and/or animal feeds with high Fe and Zn content, one of which is Tropical Alfalfa or Kacang Ratu BW as a functional feed/food source towards eradicating stunting. Program activity was the dissemination of this tropical alfalfa throughout Indonesia and one of its demonstration plots in the Mekar Farmers Group of Nglinggo, Samigaluh, through an appropriate technology scheme. The method used is learning by doing. In parallel, education on stunting was carried out. On the other hand, the community prepares feed ingredients that can be implemented in livestock to produce food/food rich in Fe and Zn. The results of the pre-test and post-test showed an increase in understanding of stunting, where before the program, 40% understood what stunting was, while the post-test results showed figures of 87-100%. Before the program, 0% knew tropical alfalfa. After the program, 93% not only knew but also planted. Massively developing feed ingredients sourced from Fe and Zn and implementing them in every family will become a solid nutritional foundation for a family-based stunting reduction mitigation pattern.

Keywords: Awareness, Extension, Family Basis, Kacang Ratu BW, Kulon Progo, Stunting.

1 Introduction

The government plans to reduce the stunting rate in the 2020-2024 National Medium-Term Development Plan (RPJMN) to 14%. It takes an extensive and well-coordinated effort to achieve this figure. The stunting rate in Indonesia is still relatively high. Using PBB standards, it is still above 20 percent (BKKBN sources say 24.4 %). This has become the concern of many parties because discussing stunting not only concerns the health of individuals but also relates to the nation's generation and competitiveness in the future. Sixty-five percent of stunted children have an intelligence level or IQ below 90 (below normal), and another 25 percent have an IQ below 70 (mental retardation) [1].

Meanwhile, in terms of physical health, stunted children are more vulnerable to various degenerative diseases. For example, if the stunting prevalence rate is 24 percent, it means that 1 out of 4 children is stunted. If that happens in Indonesia, it means that in the next 30 years, the level of competitiveness of the nation's generation will be low, which is reflected in low IQ and quality of physical health.

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One of the causes of stunting is that the body lacks micronutrients such as iron (Fe) and Zinc (Zn), so it experiences pseudo starvation. Lack of intake of these nutrients will result in stunted or disrupted physical growth in children so that children can experience stunting. The handling of stunting cannot only target the stunting toddler group. Involvement in one life cycle, starting from young women, pregnant women, and toddlers, becomes a *critical* window in specific interventions to prevent and treat stunting. Therefore, awareness for fulfilling nutrition is an awareness that needs to be grown on a family basis. In farmer families, it can be started by developing food sources and/or animal feeds with high Fe and Zn content, one of which is Tropical Alfalfa as a functional feed/food source towards eradicating stunting [1] or Kacang Ratu BW [2]. Tropical alfalfa was recognized as Indonesian biodiversity by the Center for Plant Variety Protection and Agricultural Licensing (PPVT) of the Ministry of Agriculture of the Republic of Indonesia Number 929/PVHP/2021 under the name Kacang Ratu BW [2].

Tropical alfalfa dissemination throughout Indonesia must be carried out so that every family has functional food/feed sources of Fe and Zn accompanied by education regarding stunting and appropriate technology (TTG) for planting and using tropical alfalfa. Appropriate technology for developing feed sources of Zn and Fe needs to be massively family-based. One of the development sites is in the Mekar Tani Farmer Group in Nglinggo, Pagerharjo, Samigaluh, Kulon Progo. In terms of climate, Samigaluh, which is in the highlands, has a very suitable climate for developing Tropical Alfalfa or Kacang Ratu BW (originally from sub-tropical regions). Meanwhile, Samigaluh is included in the top three (3) areas with the highest stunting rate in Kulon Progo. This pattern can be replicated in other areas with the same technology and patterns. Massively developing feed ingredients sourced from Fe and Zn and implementing them in every family will become a solid nutritional foundation for a family-based stunting reduction mitigation pattern.

2 Research Methodology

The Mekar Tani Farmer Group assisted activities were conducted in Nglinggo, Pagerharjo Village, Samigaluh District, Kulon Progo Regency. The activity was attended by 30 members of the Mekar Farmers Group. Mentoring activities are filled with structured counseling to livestock groups with various relevant themes, including:

- Counseling and understanding related to stunting. The resource persons were taken from the nearest health facility (Puskemas Samigaluh II, those appointed by the Kulon Progo District Health Office), aside from team members of the TTG program to get a felt responsibility from the local government.
- Introduction to the features and benefits of tropical alfalfa to tropical alfalfa cultivation technology: tropical alfalfa nursery, tropical alfalfa maintenance, tropical alfalfa harvesting, post-harvest processing, and use of tropical alfalfa for stunting eradication.
- Documentation of activities in the form of modules or tutorials on appropriate technology from tropical alfalfa cultivation to post-harvest processing, both in the form of printed and movies.
- The agricultural extension service from the local government was involved in fostering livestock groups, and the health service was a provision for stunting.

This activity is not only in the nature of application and dissemination of research from the Faculty of Animal Husbandry researchers. Still, it can also be a business opportunity in the animal feed sector. However, in 2022 activities will still be limited to providing information related to business opportunities from the development of Kacang Ratu BW. In the first year, with a target for the foundation of understanding in the upstream, continuing programs are pursued up to the downstream sector. Below are Roadmaps for program service activities in the form of appropriate technology at the Mekar Farmers Group in full upstream to downstream; each stage requires documentation and publication as needed.

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- Understanding stunting (causes, treatment, and mitigation)
- Understanding tropical alfalfa products or Kacang Ratu BW
- Understanding the relationship between Kacang Ratu BW and Stunting Eradication
- Tropical alfalfa nursery, maintenance, and harvest
- Post-harvest processing of tropical alfalfa
- Utilization of tropical alfalfa as a feed ingredient
- Tropical alfalfa upstream business

2.1 Indicator Performance

- There was an increase in group members' understanding of introducing new types of tropical alfalfa feed (there were pre and post-tests).
- There was an increase in group members' understanding of stunting (causes, treatment, and mitigation), and there were pre and post-tests.
- There was an increase in the understanding of group members cultivating quality forage feed rich in nutrients such as tropical alfalfa (there were pre and post-tests).

3 Results and Discussion

TTG activities in 2022 consisted of 2 main activities: community counseling/education (alfalfa and stunting) and documentation. The first counseling was related to themes of stunting. The resource persons were appointed from the nearest health facility (UPTD Puskemas Samigaluh II, Health Office of Kulon Progo Regency) and brought directly by the head of Puskesmas II. The second source was from a team member focusing on research related to stunting. Before the counseling started, a pre-test was carried out, and after the counseling, a post-test was carried out for 30 participants with questions about stunting:

Table 1: *Participant Questions and Answers (Theme: Stunting)*

No	Question	Participants answered at the Answer level									
		1	2			3		4		5	
		R	P	R	P	R	P	R	P	R	P
1	Knowing about Stunting	15		6		3	3	1	14	5	13
2	Stunting occurs in children	16		4		3	1	1	10	6	16
3	Stunting does not occur in pregnant women	18			1	6	1	2	28	4	
4	Food intake can affect stunting conditions (trigger, anticipate, cure)	16				5	2	5	13	4	15
5	Nutrition (mineral) Zn has the most influence on stunting conditions	19				6		1	14	4	16
6	Knowing the program of a thousand lives	21				3	4	1	20	5	6
7	Stunting can be cured	22				2	1	3	13	3	16

Answers: 1. Don't know 2. Don't agree 3. Doubtful 4. Agree 5. Strongly agree.
R = Pre-test; P = Post-test

The Table 1 provides information that most participants did not know about stunting (to whom it occurs, what causes it, and how the program is handled). It can be seen clearly that between 50-73% of participants answered at the level of don't know answers (1) for all questions, and around 3.3 -20% gave answers at the knowing area (4 and 5). In contrast to the post-test results, 0% of participants did not know about stunting even though they still did not understand 100%. This was reflected in the distribution of answers between 3.3 – 13% who are still unsure (doubtful) and 87-100% giving answers at levels 4 and 5.

Stunting is a condition of malnutrition, especially the mineral Zn in children, so children experience growth disorders. Stunting can threaten the nation's golden generation. Therefore, information about stunting needs to be known early on so that mitigation and prevention can be carried out. This is because stunting in children can affect children's intelligence and resistance to various diseases [3, 4]. The problem of stunting is caused by multifactor and occurs because of chronic malnutrition.

In summary, nutritional problems that trigger stunting can occur in these three populations. Young women are prospective mothers who are prone to anemia. Likewise, pregnant women who experience malnutrition can increase the risk of death and the incidence of child stunting. Baduta (babies under two years old) often have difficulty accessing nutritious food, so they cannot achieve optimal growth and development. In addition, deficiencies of micronutrients can affect brain development and children's immunity, increasing the risk of stunting.

Awareness of fulfilling nutrition is an awareness that needs to be grown in every family (family-based). In rural communities that are generally farmers, it is necessary to cultivate the provision of food sources that can be a solution or mitigation of the potential for stunting. Therefore, handling stunting cannot only target the stunting toddler group. Involvement in one life cycle, starting from young women, pregnant women, and toddlers, becomes a critical window in specific interventions to prevent and treat stunting [5]. The concern about stunting and mitigation was delivered by resources person in the counselling forum at Mekar Farmer Group, can be seen in Figure 1.

Figure 1: *Resources Persons of Stunting deliver material in the counseling forum at Mekar Farmer Group.*

The second counseling was related to introducing tropical alfalfa features and benefits, tropical alfalfa cultivation technology: tropical alfalfa nursery, tropical alfalfa maintenance, tropical alfalfa harvesting, post-harvest processing and use of tropical alfalfa for stunting eradication. Before the counseling started, a pre-test was carried out for 30 participants, and after the counseling, a post-test was carried out with questions about alfalfa tropic and its benefits:

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Table 2: *Participant Questions and Answers (theme: tropical alfalfa features and benefits).*

No	Question	Participants answered at the Answer level									
		1		2		3		4		5	
		R	P	R	P	R	P	R	P	R	P
1	Learn about alfalfa tropic	29					3	1	15		12
2	Knowing Alfalfa tropic contains high Fe and Zinc	30					2		15		13
3	Alfalfa tropic cultivation with seeds	20		1		3		4	16	2	14
4	Alfalfa tropic for animal feed	15				2	1	10	13	3	16
5	Alfalfa tropic for human food	25				1	3	2	16	1	11
6	The first harvest of tropical alfalfa is 5 months	28		1		1	1		14		15
7	The age of harvesting regular alfalfa tropic is 1 month	27		1		1	1	1	14		15

Answers: 1. Don't know 2. Don't agree 3. Doubtful 4. Agree 5. Strongly Agree

R = Pre-test; P = Post-test

The Table 2. provides information that most of the participants did not know about tropical alfalfa or Kacang Ratu BW. It can be seen clearly that between 50-100% of participants answered the "don't know" answer level (1) for all questions, and around 3.3-6.7% gave answers in the knowledge area (4 and 5). In contrast with the post-test results that 0% of the participants did not know about alfalfa tropic or Kacang Ratu BW even though they still doubted. This was reflected in the fact that there is still a distribution of answers from 3.3 to 10 % who are still unsure (doubtful), and 93-100% giving answers at levels 4 and 5.

Alfalfa is an introduced plant species whose distribution is still limited in Indonesia (Suwignyo *et al.* 2022a). Therefore, it is expected that many people still need to learn about alfalfa. Among researchers, only some of them have researched this commodity. Alfalfa tropic is a new variety developed through research since 2010 [2, 6, 7] and then has been recognized as Indonesia's biodiversity with the issuance of approval from the Center for Plant Variety Protection and Agricultural Licensing (PPVT) Ministry of Agriculture of the Republic of Indonesia Number 929/PVHP/ 2021 with the name Kacang Ratu BW [2]. This plant is rich in Fe and Zinc [2]. In addition, alfalfa is also high in crude protein content [8] and 17 amino acids [9], so apart from being used as ruminant feed, it can also be used as a poultry feed additive [9-12]. The content of saponins in it can reduce cholesterol [9-11], and the content of Fe and Zn can potentially be used either as feed or food for stunting eradication [1, 13].

Figure 2: *Counseling forum at Mekar Farmer Group and hand over Kacang Ratu BW Seed.*

By looking at the pre and post-test results, this counseling has become part of an extended target to disseminate toward the mitigation and eradication of stunting. After the counseling event, each group received tropical alfalfa seeds to be planted in their respective fields. The hand over of the tropical alfalfa seeds can be seen in Figure 2 above.

4 Conclusions

Community service is a positive activity that can be done to help the community. Counseling is an excellent educational method to bridge the gap in public knowledge (in this case) regarding stunting and tropical alfalfa. The stunting eradication program is indeed a long route. Still, the milestone starts with small things, such as a basic understanding of stunting and feed/food materials that can be used to mitigate and eradicate stunting. This appropriate technology program has contributed to understanding the Mekar Samigaluh Farmer Group, Kulon Progo community.

5 Declarations

5.1 Acknowledgments

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