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*RESEARCH ARTICLE*

# ASSESSMENT OF CARBON FOOTPRINT BUSINESS PARTNERSHIP WITHOUT RIBA SHEEP FARMING USING THE LIFE CYCLE ASSESSMENT METHOD

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## *Abstract*

This study is aiming for evaluating the resulting carbon footprint from the farmsheeppartnership endeavor without usury as well as givingalternative recommendationsfor farmsheep activity to breeders and partners. Life Cycle Assessment (LCA) identification on impacted environment using SimaPro 9.1.1 softwareutilizesbaseline CML-IA V3.06/EU2method. Evaluation on carbon footprint performed on three form partnership, namely (1)Investors provide sheeps going, while cattle managers provide cages, feed, livestock care workers (not integrated agriculture and to be used as comparison ) called SDK1, (2) Investors provide cages, land for the location of the cages, sheep seeds, and feed, while the cattle manager as livestock care workers (integrated agriculture ) called SDK2.3 , and (3) Investors provide land as the location of the cage, while the cattle manager provide feed and livestock care staff called SDK 3.Assessment results show that the carbon footprint value observed on SDK3 partnership provides the highest donation of emission carbon when compared with SDK2.3 and SDK1. However, the value of emission carbon on SDK2.3 and SDK1 partnerships also donates emission carbonlower compared to SDK2.3 and SDK3 partnership. The emission carbon on the third form of partnership is due to the existence of dirt cage and the use of fuel on transportation activity. When the recommendation is implemented, the value of emission carbon in each form of partnership experiences dropwith the highest percentage drop happens on SDK2.3 partnership, which is 59.14%, followed by the form of partnership SDK3 (49.14) and SDK1 (39.45%). Partnership form of SDK2.3 donates emission carbonlower compared to SDK1 and SDK3 partnership.



## Introduction:-

In general, the sheep farming business development program in Setu District,Bekasi Regency aims to meet the food needs for meat from sheep, improve genetic quality, population and meat production so that it is able to provide protein from livestock to meet the needs of the region and neighboring areas because Bekasi Regency is a city that supports the capital with a very large population. However, the majority of people in sheep farming are still carried out as a type of side business with a very simple and scattered maintenance system. The breeders in their efforts to improve the business structure to become the main business branch are still faced with management and capital problems, and to increase the volume of business, the breeders need additional costs in developing their livestock

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business. Besides that,farmers do not know the market information of livestock products, so that theythe livestock produced only enters the market in the nearest area.

This development can be seen from the increasing population of sheep every year. It was noted that the target population of sheep in 2019 was 13,902,492 heads for West Java, 3,639,058 heads for Central Java and 1,754,869 for East Java (Strategic Plan of the Directorate General of Livestock and Animal Health 2015-2019-Revision III). Most of the existing sheep or goat breeders are people's farms in Indonesia which are managed traditionally. Lamb meat is widely consumed by the community as satay or aqikah animals. Livestock in Indonesia are mostly people's livestock businesses that are carried out with simple tools, conventional management (Firman 2007).

Sheep farming activities can cause a new problem, namely environmental pollution. Activities start from the purchase of breeding sheep seeds until they are sold or taken by buyers. This is closely related to the activities of buying sheep, providing concentrates, and transportation activities taking feed from the vegetable market. In livestock activities, several pollutant gases are produced in the form of hydrogen sulfide, nitrogen, $CO_2$and $CH_4$. The gas can cause unpleasant odors and disturb the surrounding community, especially during the rainy season. This untreated sheep waste (dung) will usually be wasted into waters which will pollute the aquatic environment because there are pathogenic microorganisms in livestock waste (Widyastutiet al. 2013).

According to SilmiAzmiat al. (2021), recommendations for improvement to reduce Greenhouse Gas (GHG) emissions which have an impact on increasing global warming in the sector farm is by increasing feed efficiency, installing inverters on ammonia compressors, using environmentally friendly fuels, utilizing litter and manure waste as organic fertilizers accompanied by better manure storagemanagement.

Farm sheep have indication strong Secrete GHG emissions so that improvement strategies form farm sheep need done. One of them is by doing activities sheep farming integrated with plantations. According to SurotoandNurhasan(2014), an approach strategy to accelerate the development of sheep as well as to increase family income from the livestock sub-sector. One of the strategies implemented is an integrated approach that includes three aspects, namely production, economy, and social.

In recent years, public awareness of the environment has also increased. A new principle that is environmentally friendly has become an unavoidable parameter of competitiveness in the industry. The world community began to feel the impact directly so that environmental problems began to become world's attention. The establishment of the United Nations Framework Convention on Climate Change (UNFCCC) is an effort made to minimize the increase in the earth's temperature. In addition, Indonesia has stateits commitment to the Conference of Parties (COP) 15 of 2009 to lower GHG emissions by 26 % (with effort own) and by 41% (if get help international) in 2020. Indonesia's commitment strengthened through document The first Nationally Determined Contribution (NDC) of the Republic of Indonesia in November 2016 with unconditional target setting by 29% and target conditional until with 41% compared scenario business as usual (BAU) in 2030 national, reduction target emissions in 2030 based on NDC are of 834 million tons of $CO_2$ eq on the unconditional target (CM1) and 1.081 million tons of $CO_2$ eq on the conditional target (CM2). For meet these targets, _ national has conducted various action mitigation on all sector by insurer answer action mitigation (DITJENPPI 2017).

Regulations made by the government encourage the industry to become an environmentally friendly and sustainable industry. There are several methods to assess the environmental impact related to the carbon footprint,s one of them is the Life Cycle Assessment (LCA) method. LCA method can used for various products, a gradual analysis is carried out starting from the analysis of inputs, outputs and environmental impacts in the production process. LCA is also one of the methods to determine the level of sustainability of a product (Christie et al. 2011). LCA is also a comprehensive method to find out the resources used, energy consumption, costs and analyze environmental impacts in one life cycle. This one life cycle, called the cradle to grave, starts from taking raw materials from the earth until the product is used by consumers as well as by-products that are returned to the earth (Harjantoet al. 2012).

The LCA method helps in identifying potential waste or emission that will arise, consideration of decision making as well as the use of energy and raw materials needed during the production process of the product. LCA can analyze the impact reduction of alternative improvements to be made (Purwaningsih 2016).
CV Farm 74 Shariais effort farm lamb done _ through partnership between investors and partners (farmers). There is three form partnership , in which investors provide sheep seeds , while managers cattle provide cages, feed ,

livestock care workers ( not integrated agriculture and only character as comparison ) SDK1,the investor provides the cage, land for the location of the cage, sheep seeds , and feed , while the manager cattle as livestock care workers ( integrated agriculture ) SDK2 .3 , andinvestors provide land as the location of the cage , while the manager cattle provide feed and livestock care _SDK3 .On the third form partnership there is Genre input and output ingredient raw materials and energy (materials fuel and electricity) are different, so that tend will donateemission carbon(carbon footprint) different between form partnership. Based on the description above, the purpose of this research is to evaluate resulting carbon footprint from effort partnership farm sheep, as well as give recommendation alternative repair to breeders and partners.

## Method:-

**Research Time and Place**

Data collection was carried out from February to September 2020 in SetuDistrict,Bekasi Regency. The selection of the research area was carried out with the consideration that Setu District,Bekasi Regency is one of the most densely populated buffer zones for the capital. Geographical conditions and resources are very supportive of the activities of this sector, in facing the implementation of regional autonomy, agricultural sector activities are one of the priority sectors to increase people's income.

**Stage Study**

Evaluation impact environment (carbon footprint)generated _ from effort partnership without usury farm sheep use LCA method with device soft SimaPro 9.1.1 (Szafranko 2019, Pryshlakivsky and Searcy 2021). This is approach scientific comprehensive use _ for determine impact environment from various processes (Agarskiet al. 2019). All inputs, outputs and potentials impact environment related from something product along cycle his life will calculated using LCA (Pryshlakivsky and Searcy 2021). Implementation of LCA is based on guidelines ISO 14040:2006 standard which states principles and framework LCA work, and the ISO 14044:2006 standard which states LCA requirements and guidelines. Based on ISO 14040:2006 and ISO 14044:2006 standards, there are four recommended phase_in LCA study, namely purpose and space scope definition, Life Cycle Inventory Analysis (LCI), Life Cycle Impact Assessment (LCIA), interpretation, and improvement (Figure 1).

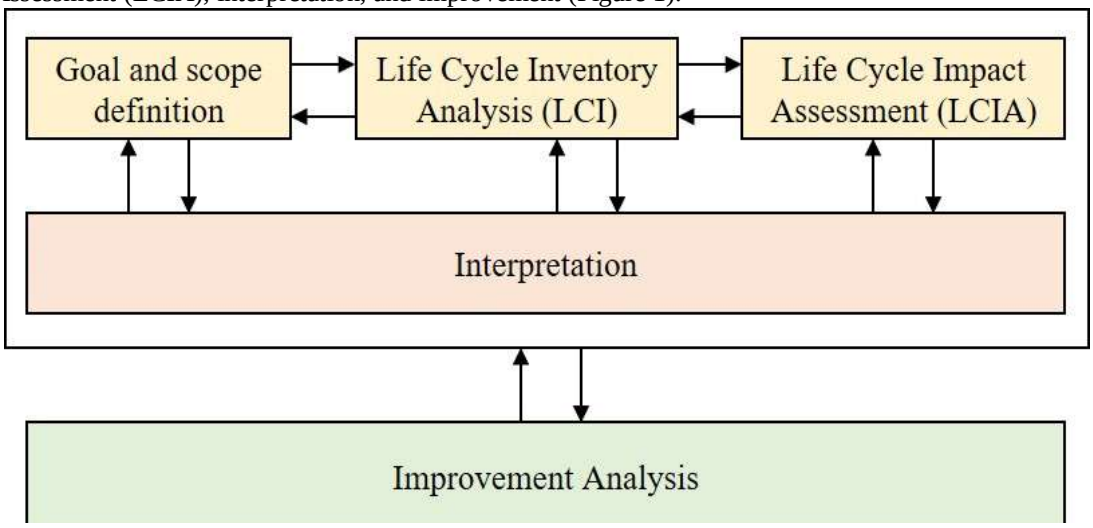



**Figure 1:-** LCA stage.

**Goals and Scope Definitions**

Business LCA partnership without usury farm sheep aim for compare impact environment (carbon footprint) of three form partnerships, namely SDK1, SDK2.1, and SDK3. Scope analysis focus on three activities, that is transportation, livestock, and plantations from three form partnership.

**Life Cycle Inventory Analysis (LCI)**

According to Marendraet al. (2018), LCI follows ISO 14040:2006 and ISO 14040:2006 standards, which consist frominputand output data collection from system production product. In LCI, total energy and material inputs, as well as total product, product side, and the emissions generated in each activity calculated per functional unit, ie per

kg of sheep. Data validation is done with method lookup (search), where data is results measurement whose value measurable by math.

**Life Cycle Impact Assessment (LCIA)**
Impact assessment analyzed in LCA study in effort partnership without usury on activities farm sheepfocusonappraisalemission carbon(carbon footprint)orGlobal Warming Potential – GWP (kg $CO_2$ -eq), which refers to the life cycle assessment guidelines contained in the Minister of Environment and Forestry No. 1 of 2021 concerning the Company Performance Rating Program in Environmental Management.The characterization of each resource use and the resulting emissions are modeled quantitatively based on the predetermined impact categories. The main objective is to convert data on resource use and resulting emissions into predetermined impact values (CML 2002).

**Interpretation and Improvement**
The results of the LCA study will be the basis used as a reference for decision making and improvement policies (Marendraet al. 2018). Interpretation is a systematic technique for evaluating information from life cycle inventory results and life cycle impact assessment results. The evaluation results from the LCI and LCIA are summarized in the interpretation stage which is a series of conclusions and recommendations in the study.

Analysis repair conducted with a number of method like reduce CO2 $emisi_{emissions}$ with minimize use energy, water and electricity use, and efficiency distance transportation materials and minimize waste.

## Results and Discussion:-

**Shape SDK1 Partnership**
**Goals and Scope Definitions**
Business LCA partnership without usury farm sheep aim for compare impact environment (carbon footprint) of form SDK1 partnership. Scope analysis focus on three activity, that is transportation, livestock, and plantations from three form partnership (see Figure 10).

Based on Figure 2, the input of materials and energy in the form of SDK1 partnership consists from seeds sheep, feed grass, electricity and drinking water sheep. Output from form SDK1 partnership only in the form of sheep ready sell, shit cage wasted sheep _ so just environment (not yet) utilized), and emissions vehicle wasted transportation _ free to environment.

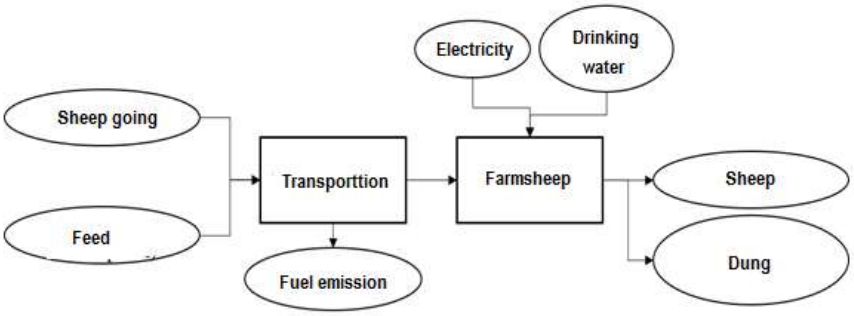



**Figure 2:-** Input - output diagram of SDK1 partnership.

**Life Cycle Inventory Analysis (LCI)**
Based on Table 1, which becomes hotspot on business partnership without usury on activities farm SDK1 sheep is on procurement feed grass and dirt cage sheep, which are 22.5000 kg per kg of sheep and 1.3125 kg per kg of sheep, respectively.

**Table 1:-** LCI on the form SDK1 partnership.

| Inputs and Outputs | Unit | Value (units per kg of sheep) |
|---|---|---|
| Transportation Activities | | |
| Input material x distance: | | |

| | | |
|---|---|---|
| 1. Lamb seeds | tkm | 0.0090 |
| 2. Feed n grass | tkm | 0.0225 |
| Material output: | | |
| 1. Lamb seeds | kg | 0.5000 |
| 2. Use grass | kg | 22.5000 |
| Farm Activities | | |
| Inputs: | | |
| 1. Lamb seeds | kg | 0.5000 |
| 2. Use grass | kg | 22.5000 |
| 3. Sheep drinking water | L | 0.0250 |
| 4. Electricity | kWh | 0.031 3 |
| 13. Sheep shed dung | kg | 1.3125 |
| Outputs: | | |
| 1. Sheep | kg | 1.0000 |
| 2. Sheep shed dung | kg | 1.3125 |

**Life Cycle Impact Assessment(Characterization)**

Assessment results carbon footprintor emission carbonon shape SDK1 partnership (see Figure 11) shows contributor emission carbonhighest earned on activity farm, that is 12,5 6 kg CO 2 $_{-eq}$per kg sheep or around 58.82% of the total impact environment. This thing caused because dirt cage wasted sheep _ sojust to environment (no utilized) so that potential increase emission carbon. Contributor emission carbonhighest to two earned on activity transportation seeds sheep, which is 8.42 kg CO $_2$ -eq per kg sheep or around 39.45% of the total impact environment. This thing caused because existence activity transportation, where exhaust emissions _ wasted just like that to environment so that potential increase emission carbon. Whereas activity transportation feed grass donateemission carbon with low value, which is 0.37 kg CO $_2$ -eq per kg sheep or about 1.73% of the total impact environment.

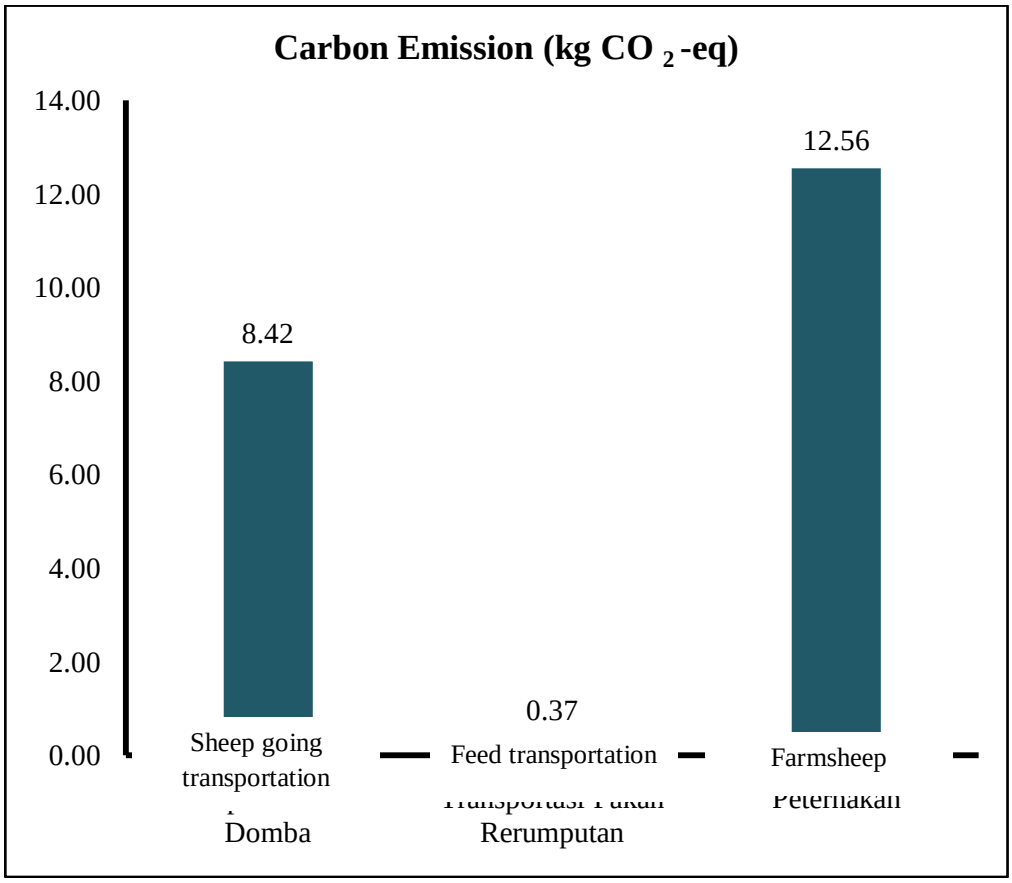



**Figure 3:-** Emission valuecarbonform SDK1 partnership.

**Shape SDK2.3 Partnership**
**Goals and Scope Definitions**
Business LCA partnership without usury farm sheep aim for compare impact environment (carbon footprint) of form SDK2.3 partnership. Scope analysis focus on three activity, that is transportation, livestock, and plantations from three form partnership (see Figure 12).

On the shape SDK2.3 partnership (Figure 4), material and energy input consist from seeds lamb, ingredients cleaners, feed (grass, silage, concentrates, and dregs know), seeds vegetables and grass, electricity, as well as drinking water and sheep bathing. Output from form SDK3 partnership in the form of lamb and vegetables ready sell, shit cage used sheep _ as fertilizer on activity plantation, waste vegetables and grass used _ as feed livestock on activity livestock, and emissions vehicle wasted transportation free to environment.

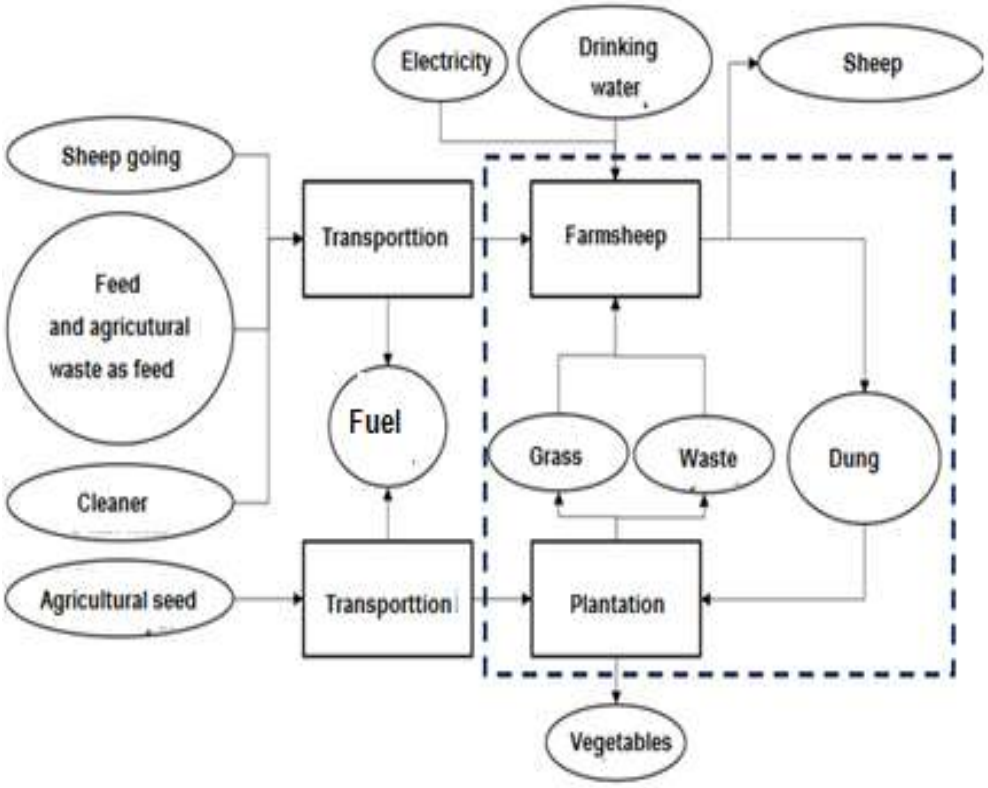



**Figure 4:-** Form input output diagram SDK2.3 partnership.

**Life Cycle Inventory Analysis (LCI)**
Based on Table 8, which becomes hotspot on business partnership without usury on activities farm SDK2.3 sheep is on procurement feed dregs know, shit cage sheep, and procurement feed grasses, namely 8.1818 kg per kg sheep, 5,727 3 kg per kg sheep, and 5.4545 kg per kg sheep.

**Table 2:-** LCI onform SDK2.3 partnership.

| Inputs and Outputs | Unit | Value (units per kg of sheep) |
|---|---|---|
| Transportation Activities | | |
| Input material x distance: | | |
| 1. Lamb seeds | tkm | 0.0098 |
| 2. Vegetable feed | tkm | 0.0013 |
| 3. Concentrated feed | tkm | 0.003 3 |
| 4. Feed tofu dregs | tkm | 0.016 4 |
| 5. Feed silage | tkm | 0.008 4 |
| 6. Feed n grass | tkm | 0.005 5 |

| | | |
|---|---|---|
| 7. Cleaning agent | pkm | 0.001 6 |
| 8. Vegetable seeds | pkm | 0.003 2 |
| 9. Grass seeds | pkm | 0.003 7 |
| Material output: | | |
| 1. Lamb seeds | kg | 0.545 5 |
| 2. Vegetable feed | kg | 0.1818 |
| 3. Concentrated feed | kg | 0.1818 |
| 4. Feed tofu dregs | kg | 8.1818 |
| 5. Feed silage | kg | 0.1818 |
| 6. Use grass | kg | 5.4545 |
| 7. Cleaning agent | kg | 0.0030 |
| 8. Vegetable seeds | kg | 0.0045 |
| 9. Grass seeds | kg | 0.0189 |
| Livestock and Plantation Activities | | |
| Inputs: | | |
| 1. Lamb seeds | kg | 0.545 5 |
| 2. Vegetable feed | kg | 0.1818 |
| 3. Concentrated feed | kg | 0.1818 |
| 4. Feed tofu dregs | kg | 8.1818 |
| 5. Feed silage | kg | 0.1818 |
| 6. Use grass | kg | 5.4545 |
| 7. Cleaning agent | kg | 0.0030 |
| 8. Vegetable seeds | kg | 0.0045 |
| 9. Grass seeds | kg | 0.0189 |
| 10. Sheep drinking water | L | 0.136 4 |
| 11. Sheep bath water | L | 0.606 1 |
| 12. Electric | kWh | 0.0303 |
| 13. Sheep shed dung | kg | 5,727 3 |
| Outputs: | | |
| 1. Sheep | kg | 1.0000 |
| 2. Wastewater | L | 0.606 1 |
| 3. Sheep shed dung | kg | 5,727 3 |

**Life Cycle Impact Assessment(Characterization)**

Assessment results carbon footprintor emission carbonon shape SDK2.3 partnership (see Figure 13) shows contributor emission carbonhighest earned on activity transportation seeds sheep, which is 8.42 kg $CO_2$-eq per kg sheep or about 35.00% of the total impact environment. This thing caused because existence activity transportation, where exhaust emissions _ wasted just like that to environment so that potential increase emission carbon. Contributor emission carbonhighest to two earned on activitylivestock and plantations, which is 7.02 kg $CO_2$-eq per kg sheep or around 29.17% of the total impact environment. This thing caused because dirt cage wasted sheep _ to environment moment applied as fertilizer on land plantation so that potential increase emission carbon. Contributor emission carbonhighest to three earned on activity transportation ingredient cleaner, which is 5.81 kg $CO_2$-eq per kg sheep or around 24.14% of the total impact environment. This thing caused because procurement ingredient cleaners that don't collective with procurement goods other so thatpotential increase emission carbon. Contributor emission carbonhighest to four earned on activity transportation feed silage, which is 1.51 kg $CO_2$-eq per kg sheep or about 6.26% of the total impact environment. Whereas for activity other donate emission carbonwith low value _ about 0.01 – 0.37 kg $CO_2$-eq per kg sheep.

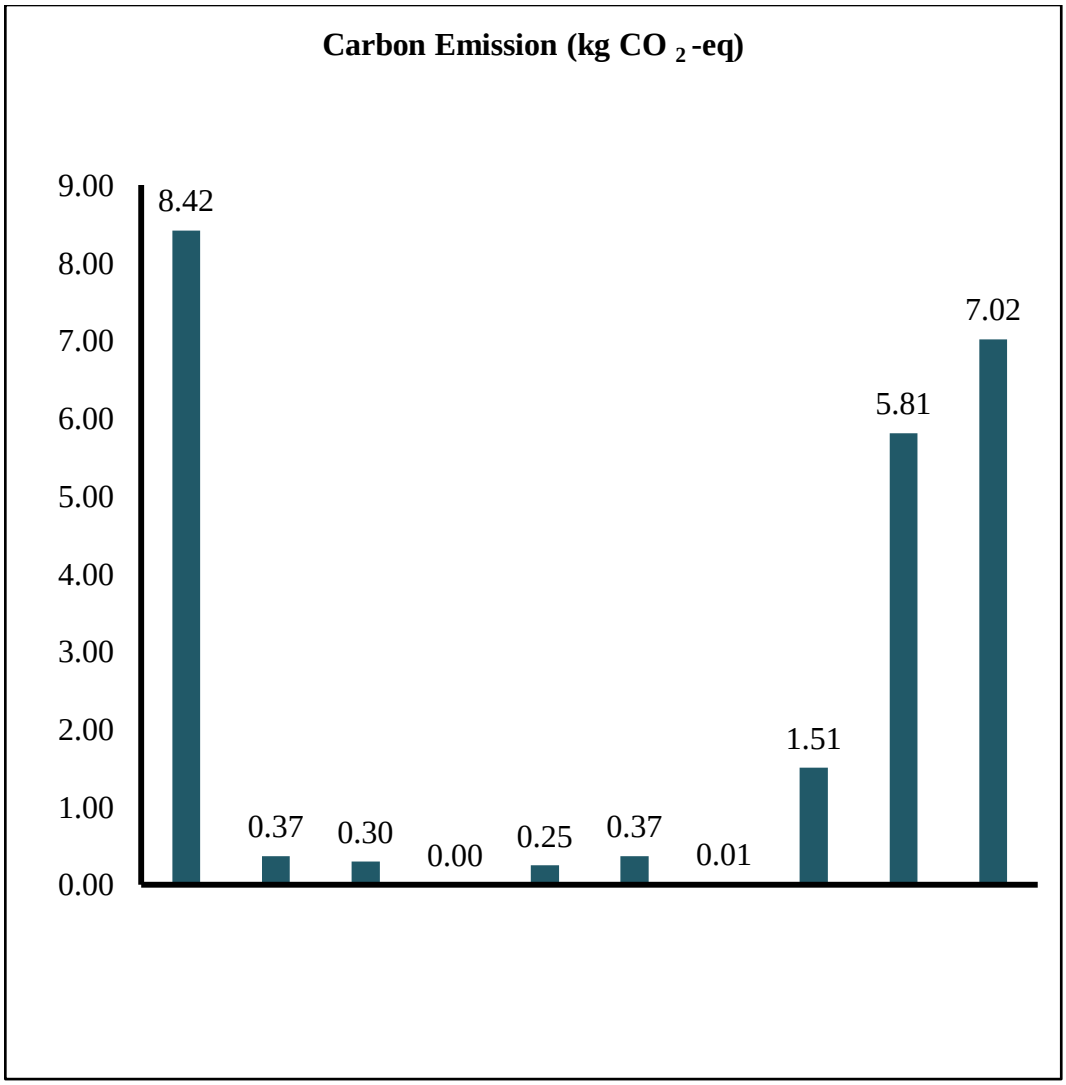



**Figure 5:-** Emission valuecarbonform SDK2.3 partnership.

**Shape SDK3 Partnership**

**Goals and Scope Definitions**

Business LCA partnership without usury farm sheep aim for compare impact environment (carbon footprint) of form SDK3 partnership. Scope analysis focus on three activity, that is transportation, livestock, and plantations from three form partnership (see Figure 14).

On the shape SDK3 partnership (see Figure 14), material and energy input consist from seeds lamb, ingredients cleaner, feed grass, electricity, and drinking water and sheep bathing. Output from form SDK3 partnership only in the form of sheep ready sell, shit cage sheep used by the community around as fertilizers, and emissions vehicle wasted transportation _ free to environment.

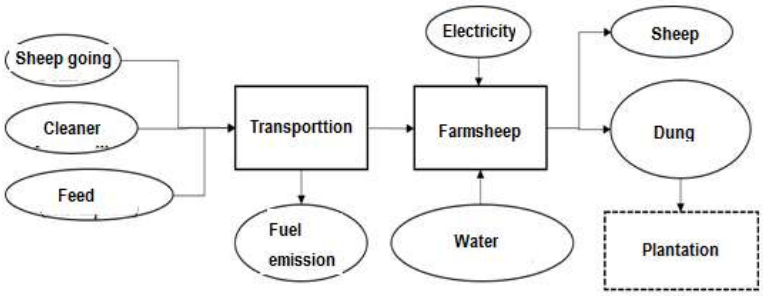



**Figure 6:-** Form input output diagram SDK3 partnership.

**Life Cycle Inventory Analysis (LCI)**

Based on Table 3, which becomes hotspot on business partnership without usury on activities farm SDK3 sheep is on procurement feed grass and dirt cage sheep, which are 24.1071 kg per kg of sheep and 4.50 00 kg per kg of sheep, respectively.

**Table 3:-** LCI onform SDK3 partnership.

| Inputs and Outputs | Unit | Value (units per kg of sheep) |
|---|---|---|
| Transportation Activities | | |
| Input material x distance: | | |
| 1. Lamb seeds | tkm | 0.011 6 |
| 2. Feed n grass | tkm | 0.0241 |
| 3. Cleaning agent | pkm | 0.0023 |
| Material output: | | |
| 1. Lamb seeds | kg | 0.642 9 |
| 2. Use grass | kg | 24.1071 |
| 3. Cleaning agent | kg | 0.004 5 |
| Farm Activities | | |
| Inputs: | | |
| 1. Lamb seeds | kg | 0.642 9 |
| 2. Use grass | kg | 24.1071 |
| 3. Cleaning agent | kg | 0.004 5 |
| 4. Sheep drinking water | L | 0.0357 |
| 5. Sheep bath water | L | 0.4464 |
| 6. Electricity | kWh | 0.011 2 |
| 7. Sheep shed dung | kg | 4,5000 |
| Outputs: | | |
| 1. Sheep | kg | 1.0000 |
| 2. Wastewater | L | 0.4464 |
| 3. Sheep shed dung | kg | 4,5000 |

**Life Cycle Impact Assessment(Characterization)**

Assessment results carbon footprintor emission carbonon shape SDK3 partnership (see Figure 15) shows contributor emission carbonhighest earned on activity farm, that is 1 4.3 6 kg $CO_2$ -eq per kg sheep or around 49.58% of the total impact environment. This thing caused because dirt cage wasted sheep _ to environment moment applied as fertilizer on land plantation owned by inhabitant around so that potential increase emission carbon. Contributor emission carbonhighest to two earned on activity transportation seeds sheep, which is 8.42 kg $CO_2$ -eq per kg sheep or around 29.08% of the total impact environment. This thing caused because existence activity transportation, where exhaust emissions _ wasted just like that to environment so that potential increase emission carbon. Contributor emission carbonhighest to three earned on activity transportation ingredient cleaner, which is 5.81 kg $CO_2$ -eq per kg sheep or about 20.06% of the total impact environment. This thing caused because procurement ingredient cleaners that don't collective with procurement goods other so that potential increase emission carbon. Whereas activity transportation feed grass donateemissioncarbonwith low value, which is 0.37 kg $CO_2$ -eq per kg sheep or about 1.28% of the total impact environment.

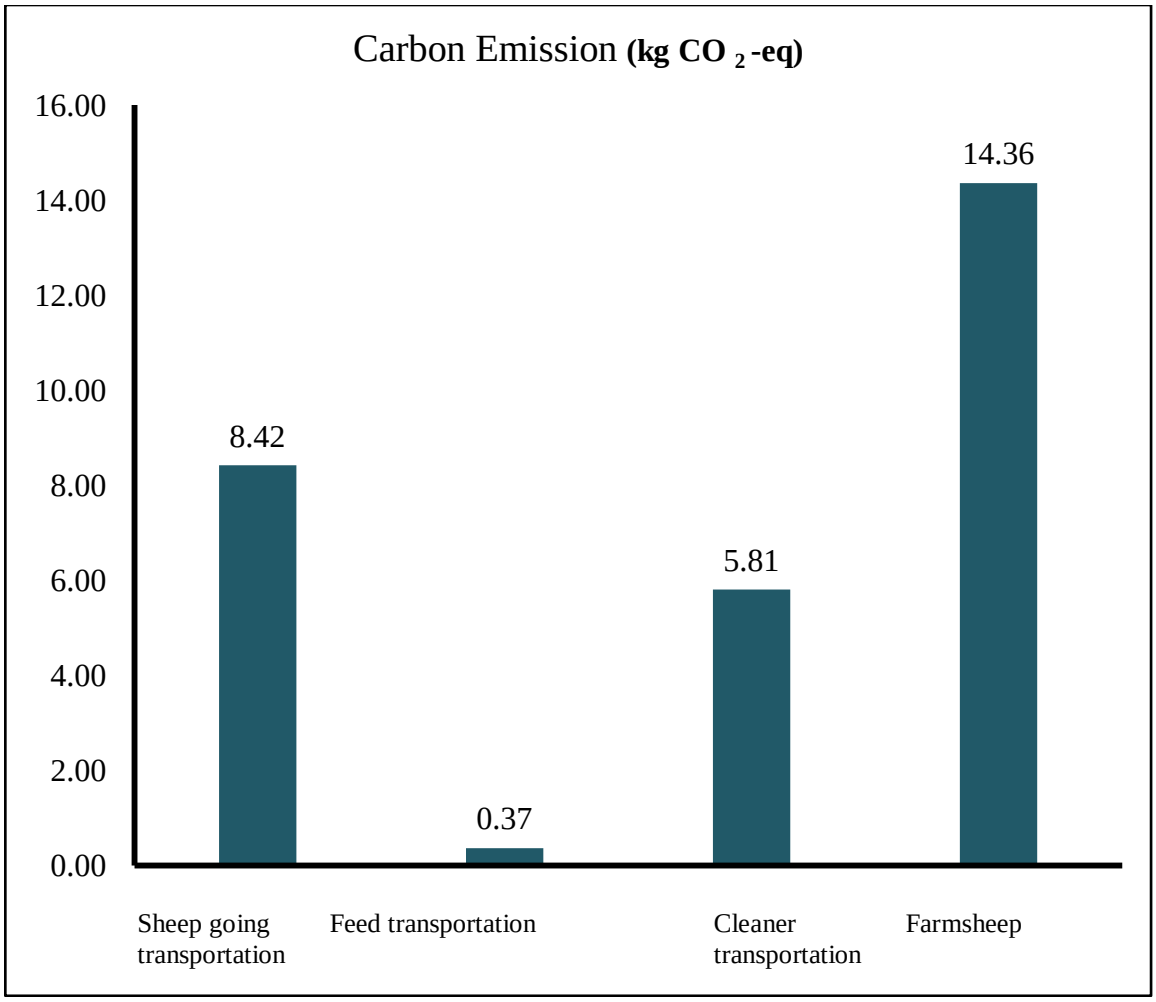
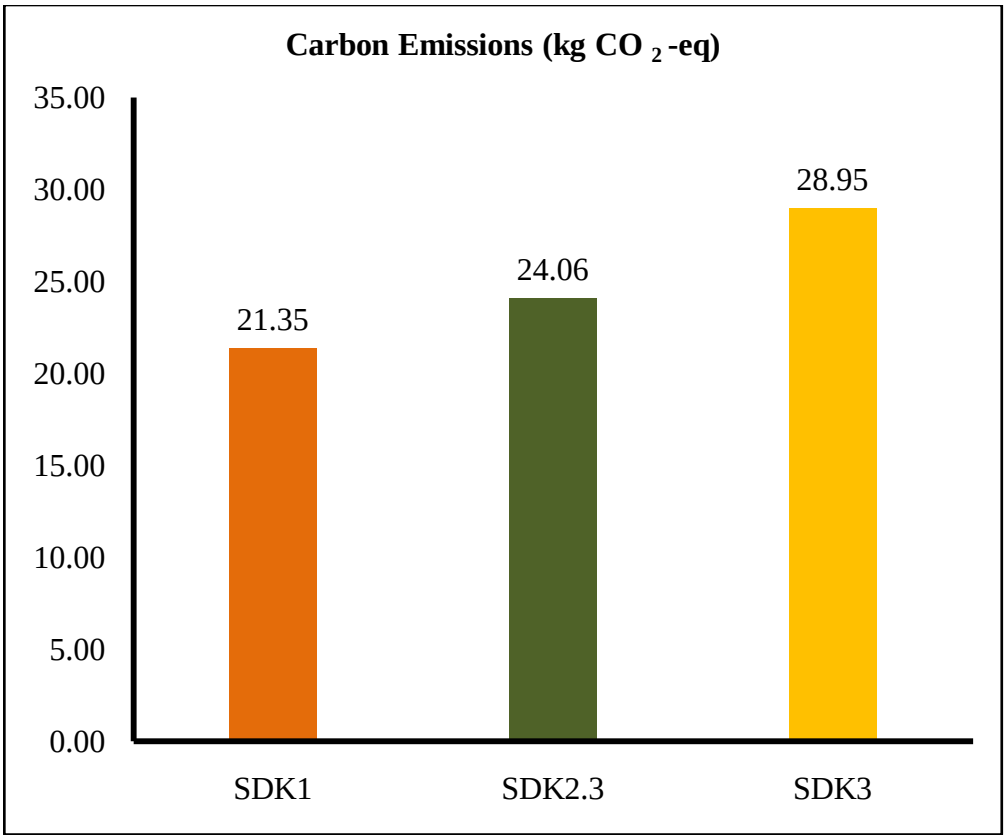



**Figure 7:-** Emission valuecarbonform SDK3 partnership.

**Interpretation Impact Environment from Form SDK1, SDK2.3, and SDK3 Kemitraan Partnership**

When compared Among three form partnership, form SDK3 partnership provides donation emission carbonhighest if compared with form SDK2.3 and SDK1 partnership. However, the value of emission carbonon shape SDK2.3 and SDK1 partnerships also belong height and shape SDK1 partnership donates emission carbonmorelow compared with form SDK2.3 and SDK3 partnership. height score emission carbonon the third form partnership caused because existence dirt cage sheep on activity farm and existence use ingredient burn on activity transportation material. Emission carbongenerated _ from sector farm consist of methane ($CH_4$) and nitrous oxide ($N2_O$). Profile emission carbongenerated _ determined based on population his cattle (Saputraet al. 2019). The more tall population livestock, emissions carbon produced _ will the more tall if no managed with good. Besides it, sector transportation contributor emission carbonbiggest second on use energy in Indonesia. This thing reported always experience enhancement at each an average of 7.17% (ESDM 2019), in line with the more increase use ingredient fuel (ESDM 2020). because of that, minimization activity transportation Becomes solution in reduce consumption ingredient fuel which has an impact on decreasing emission carbon.



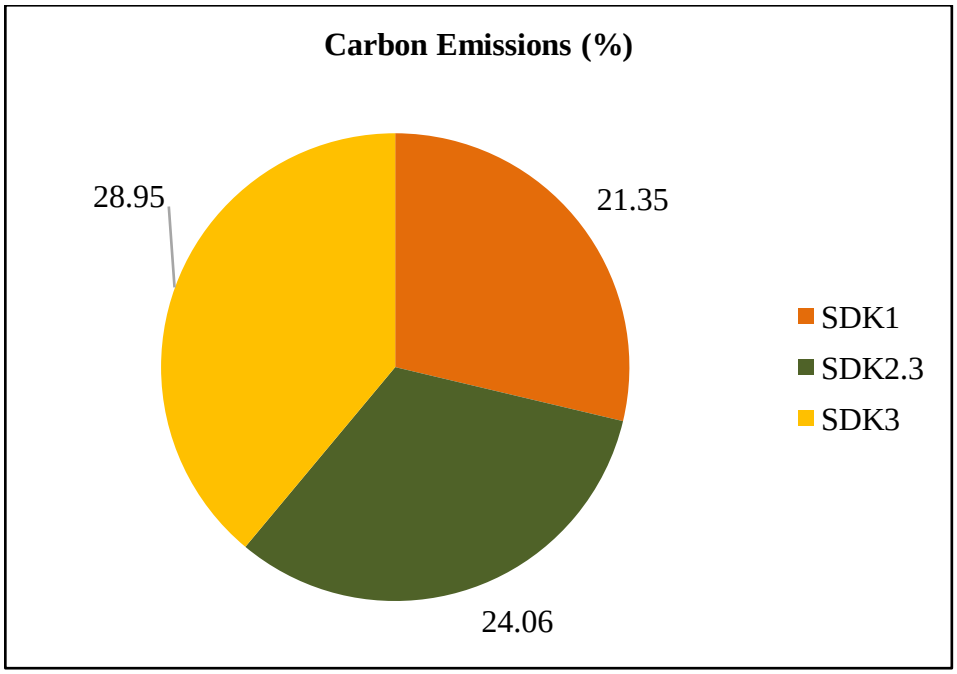




**Figure 8:-** Value and Percentage donation emission carbonon three form partnership.

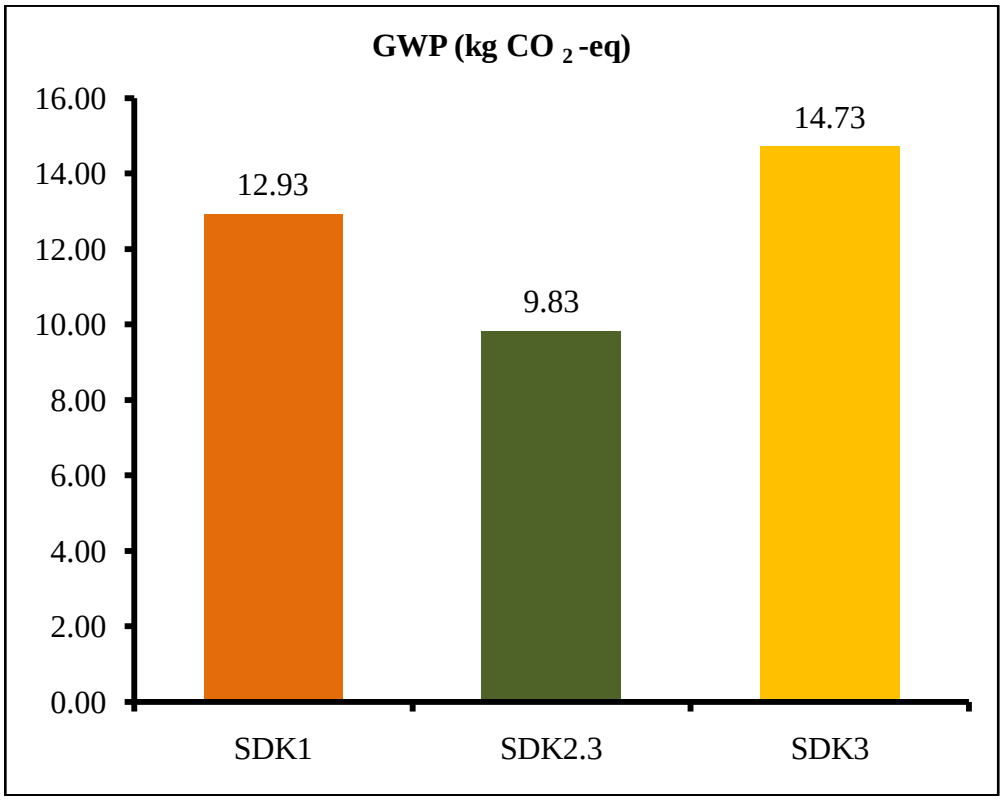
By general, farm sheep have impact positive and negative. Impact positive from cattle sheep in Finland rated using the "planetary boundary perspective" (in category protection diversity biological biotopes or diversity genetics and flow biogeochemistry), in addition to conventional LCA metrics about change climate, water use, and use land.

Impact related negatives _ with cattle sheep in category change climate, water demand and use land observed (Uusitaloet al. 2019).

**Repair**

Made with the aim of minimizing the environmental impact generated in each form partnership. Based on the resultsLCIA in every form partnership of sheep farming activities, the improvements made to the threeformpartnershipis by minimizing emissions from transportation activities of cleaning agents and seeds sheep. The cleaning agent transport activity in the form SDK2.3 partnership is removed and integrated into the transportation of vegetable seeds and grass seed transportation activities, so that it becomes a single unit of activity for transportation of vegetable seeds, grass seeds, and cleaning materials. While in the form of SDK3 partnership, cleaning material transportation activities remain at the initial conditions, but the distance is minimized and the vehicles used are optimized. On activity transportation seeds lamb, done purchase seeds sheep in the neighborhood around (community around) with system empowerment society formed _ on base deal together between investors and partners with Public local.

Based on results repair (Figure 9), shape fixed SDK3 partnershipgive donation emission carbonhighest if compared with form SDK2.3 and SDK1 partnership. However, the value of emission carbonon shape SDK2.3 and SDK1 partnerships also belong height and shape SDK2.3 partnership donates emission carbonmorelow compared with form SDK1 and SDK3 partnership. However, the value of emission carbonon each form partnership experience drop after conducted repair with percentage highest drop _ happens to result repair form SDK2.3 partnership, which is 59.14%, followed by the form SDK3 (49.14) and SDK1 (39.45%) partnerships (Table 10).



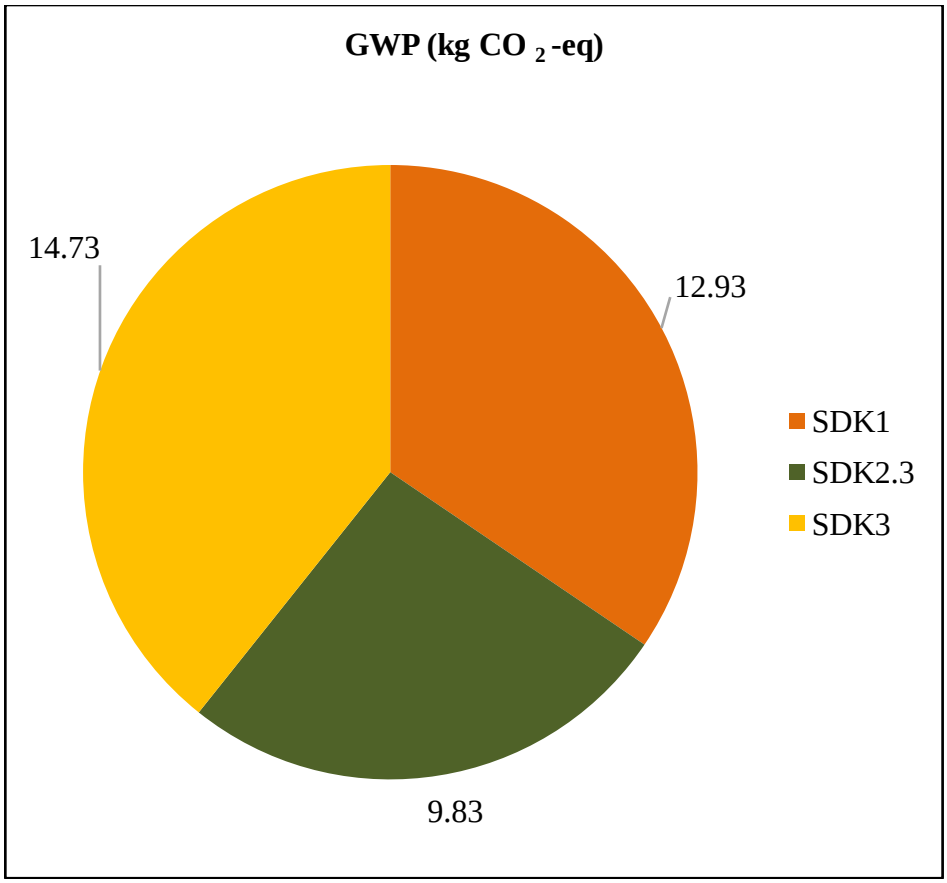



**Figure 9:-** Value and Percentage donation emission carbonon three form partnership after repair.

**Table 4:-** Percentage drop impact environmenton three form partnership after repair.

| Form Partnership | Carbon Emission(kg $CO_2$-eq) | | Percentage Decrease Impact Environment |
|---|---|---|---|
| | Existing | Repair | |
| SDK1 | 21.35 | 12.93 | 39.45% |
| SDK2 | 24.06 | 9.83 | 59.14% |
| SDK3 | 28.95 | 14.73 | 49.14% |

## Conclusion Case:-

Assessment results show the carbon footprint value obtained in the form SDK3 partnership provides donation emission carbonhighest if compared with form SDK2.3 and SDK1 partnership. However, the value of emission carbonon shape SDK2.3 and SDK1 partnerships also belong height and shape SDK1 partnership donates emission carbonmorelow compared with form SDK2.3 and SDK3 partnership. Based on results repair, value emission carbon in each form partnership experience drop after conducted repair with percentage highest drop _ happens to result repair form SDK2.3 partnership, which is 59.14%, followed by the form partnership SDK3 (49.14) and SDK1 (39.45%). Form SDK2.3 partnership donates emission carbonmorelow compared with form SDK1 and SDK3 partnership.

Height score emission carbon on the third form partnership caused because existence dirt cage sheep on activity farm and existence use ingredient burn on activity transportation material because of that repair Keep going manage need conducted for minimize emission carbon produced in the future.

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